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Subject: A.C.E. Revision II – Study Plan for Comparison of A.C.E. Revision II Results with Demographic Analysis

## 1. Background

The primary goal of this study is to assess the agreement of the A.C.E. Revision II estimates of net census coverage in Census 2000 with the coverage results based on Demographic Analysis

### 1.1 The Method of Demographic Analysis

Demographic Analysis (DA) 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.

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

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. Revision II coverage results.

## **1.2 Difference between DA and Initial A.C.E. Results**

### **DA Estimates of Coverage: March 2001**

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 for net census undercount based on data from the A.C.E. The broad overarching concern was that the DA and the initial A.C.E. estimates of the population were inconsistent.

The initial set of DA estimates that were developed and compared to the Census 2000 counts in the March 2001 evaluation are referred to as the “Base” DA estimates. The Census 2000 count of 281.4 million was 1.8 million higher than the Base DA estimate of 279.6 million. The difference implied a net census overcount of 0.65 percent. This net coverage is dramatically different from that in the 1990 or any previous census—which had substantial net undercounts.

The initial DA result for 2000, which fell below the census total, was unexpected. When we examined the detailed DA estimates by age and sex, we realized that underestimation of immigration, particularly unauthorized migration, could be a reason for these unexpected results. We conducted a systematic analysis that led to alternative assumptions about the growth of the migrant population, in particular, about the increase in the number of unauthorized migrants. A set of revised DA estimates was prepared in March 2001, to account for the probable understatement of immigration, are referred to as “Alternative” DA. The Alternative DA estimate of 282.3 million was 0.9 million above the Census 2000 count, implying a small net census undercount of 0.32 percent.

Either of the two DA sets—the Base DA or Alternative DA—were below the March A.C.E. estimate of 284.7 million, and imply a much greater reduction in net undercount from 1990.

Between March and October of 2001, we conducted an extensive review of the components of population change used to construct the DA estimates. The research activities were concentrated in two areas: (1) analysis of the administrative records used in the DA estimates (births, deaths, legal international migration, Medicare data), and (2) recalibration of the international migration components (in particular, those components that are least well measured—unauthorized migration, emigration, and temporary migration). The major data set that enabled this review was an early tabulation from Census 2000 on the foreign-born population—this data set was not available in March 2001.

This review led to revisions of the components used to construct the DA estimates.

### **DA Estimates of Coverage: October 2001**

The DA estimates for 2000 that resulted from the analysis of various administrative records and the recalibration of the international migration components are referred to as the “Revised” DA. Although the various analyses led to changes in the estimated components of births, deaths, and international migration, the total DA population and demographic composition of the revised DA estimates were not significantly different from the Alternative DA estimates of March.

Compared to the Census 2000 count of 281.4 million, the Revised DA estimate of 281.8 million implies a net census undercount of 0.12 percent. The net census undercount in 2000 remains dramatically different from that in the 1990 under the revised DA set. In 1990, the revised net undercount was 4.2 million, or 1.65 percent.

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).

### **Revision of A.C.E. Estimates**

On October 15, 2001, the Census Bureau issued the second recommendation of the Executive Steering Committee for A.C.E. Policy (ESCAP) that the Census 2000 Redistricting Data not be adjusted for net census undercount based on data from the A.C.E. Concern remained that the DA and the initial A.C.E. estimates of the population were inconsistent. Another reason for the recommendation was concerns about the accuracy of the A.C.E. results that surfaced in the review of the estimates between March and October. In particular, evidence indicated that a large number of duplicates in the census were not properly measured in the A.C.E. estimation.

Subsequently, an intensive reexamination of the A.C.E. data, procedures, and estimates was conducted. This process culminated in a set of A.C.E. Revision II estimates of population and net census undercount, which can be compared to the Revised DA estimates.

## 2. Questions to be Answered

This study answers the following questions:

1. What is the agreement of the A.C.E. Revision II and DA undercount rates for Census 2000 in terms of measuring differences in coverage between demographic groups
  - Black versus Nonblack
  - Male versus Female
  - Broad age groups
  - Combinations of race, sex, and age groups (e.g., differential coverage of adult Black men or Black children)
2. What is the agreement of the A.C.E. Revision II and DA sex ratios (a measure of differential coverage of males and females, specific to race)
3. What is the agreement of the A.C.E. Revision II and DA undercount levels (this question is secondary to questions 1 and 2, as DA does a better job of measuring differences in coverage between groups than for levels)
4. What is the agreement of the A.C.E. Revision II and DA in measuring change in net census undercounts from 1990 to 2000 and reductions in differential undercounts?

## 3. Methodology

The methods involved in developing the DA estimates and comparison to the 1990 PES or 2000 A.C.E. Revision II estimates follow the steps described in the previous two ESCAP reports. The revised DA estimates are formatted in the demographic detail needed for comparison to the A.C.E. (Male and female, race categories of Black and NonBlack, five age categories of 0-9, 10-17, 18-29, 30-49, and 50+). Likewise, the A.C.E. Revision II estimates are modified to match the population universe of DA (resident population, including Group Quarters).

A series of tables are generated to make the DA-A.C.E. comparisons and answer the questions in Section 2. Table A and B provide examples of the comparisons.

## 4. Data Requirements

- Household Population (A.C.E.-based and census totals)
- Group Quarters (Census and A.C.E.-based)
- Demographic detail
  - Race: Black tabulated by Model 1 (reported Black alone)  
Black tabulated by Model 2 (reported Black and any other race)
  - Origin: Hispanic, Not Hispanic
  - Sex : Male, Female

- Age: 0-9, 10-17, 18-29, 30-49, 50+  
More detail as available (to compare to DA single years of age estimates)
- Geographic detail  
National

## **5. Division Responsibilities**

- \* The Decennial Statistical Studies Division (DSSD) will be responsible for creating the files containing the results of the A.C.E. Revision II.
- \* The Population Division will be responsible for providing the Demographic Analysis results and conduct the analysis of the agreement of the A.C.E. Revision II and DA results.

## **6. Limitations**

- \* For purposes of comparison to A.C.E. Revision II results, we assume the coverage differentials measured by DA are accurate. We have not yet developed statistically-based assessments of uncertainty for the DA estimates.
- \* We assume that universe differences don't affect the comparison of coverage estimates from DA (based on total population) and A.C.E. Revision II (based on household population).

## **7. Issues that Need to be Resolved**

- \* How do we test the significance of differences between the Revised A.C.E. and DA results.

**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	
	1990	2000	PES 1990	A.C.E. 2000
<b>Total</b>	1.65	0.12	1.58	1.15
<b>Black</b>	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
<b>NonBlack</b>	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, 2001, ESCAP II, Report No. 1, Table A.

PES - Post Enumeration Survey

A.C.E. Accuracy and Coverage Evaluation - (Note: These A.C.E. numbers reflect the March 2001 results and will change with the A.C.E. Revision II results.)

**Table B--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
<b>BLACK MALE</b>				
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
<b>BLACK FEMALE</b>				
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
<b>NONBLACK MALE</b>				
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
<b>NONBLACK FEMALE</b>				
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, 2001, ESCAP II, Report No. 1, Table 7.

Note: These A.C.E. number reflect the March 2001 results and will change with the A.C.E. Revision II results.