



December 31, 2002

DSSD A.C.E. REVISION II MEMORANDUM SERIES #PP-50

MEMORANDUM FOR Donna Kostanich
Chair, A.C.E. Revision II Planning Group

Through: Mary H. Mulry *signed 12/31/02* *MHM*
Chair, A.C.E. Revision II Assessment Subgroup

Prepared by: J. Gregory Robinson, Population Division and
Glenn S. Wolfgang, Decennial Statistical Studies Division

Subject: Comparison of A.C.E. Revision II Population Coverage Results
with HUCS Housing Coverage Results

The attached report was prepared at your request to inform the executive staff of the A.C.E. Revision II findings and associated limitations. This document focuses on the consistency of the A.C.E. Revision II results with findings on coverage based on the Housing Unit Coverage Study (HUCS).

This report and the other reports in this series reflect our findings to date. Our plan is to continue investigating issues as they relate to improving coverage and coverage measurement for the 2010 Census.

Comparison of A.C.E. Revision II Population Coverage Results with HUCS Housing Coverage Results

J. Gregory Robinson
Glenn S. Wolfgang

Population Division
Decennial Statistical Studies Division

CONTENTS

EXECUTIVE SUMMARY	ii
1. BACKGROUND	1
2. METHODOLOGY	1
3. LIMITATIONS	2
4. RESULTS	2
5. REFERENCES	7

TABLES

Table 1. Total Population and Census Region, Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Standard error in parenthesis)	3
Table 2. Type of Area, Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Standard error in parenthesis)	4
Table 3. Tenure, Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Standard error in parenthesis)	5
Table 4. Race/Origin, Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Standard error in parenthesis)	6
Table 5. Type of Structure, Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Standard error in parenthesis)	7

EXECUTIVE SUMMARY

What is the agreement of the Accuracy Coverage Evaluation (A.C.E.) Revision II and Housing Unit Coverage Study (HUCS) undercount rates for Census 2000 in terms of measuring differences in coverage between geographic areas and demographic groups?

The A.C.E. Revision II and HUCS estimates are compared for 5 major classifications:

- Census region
- Type of area (Metropolitan/Non-Metro, type of enumeration area)
- Tenure (Renter versus Owner)
- Race/Origin (Hispanic, Non-Hispanic Black, Non-Hispanic White)
- Type of Structure (single unit, multi-unit)

The A.C.E. Revision II estimates of population coverage agree with the HUCS results on housing coverage in the measurement of coverage patterns by region, type of area, and tenure. Both estimates show little systematic variation in coverage between regions or between types of areas in 2000. Both estimates measure a higher net census undercount of renter-occupied units than owner-occupied units.

The A.C.E. Revision II estimates do not agree with the HUCS results in measuring differential coverage for some race/origin groups. In particular, the A.C.E. Revision II measures a higher net census undercount of Non-Hispanic Blacks than Non-Hispanic Whites (a similar relationship is measured in the 1990 PES), while the HUCS estimates a higher net census undercount of housing units occupied by Non-Hispanic White householders than Black householders. The reverse pattern is also found for Hispanics compared to Non-Hispanic Whites. We need to do further research into the causes of this “reverse” coverage relationship.

The A.C.E. Revision II estimates also show some inconsistencies for the population and housing estimates classified by type of structure (single units versus multi-units), but the differentials are generally not as pronounced for the findings on race/origin.

What is the agreement of the A.C.E. Revision II and HUCS in measuring change in net census undercounts from 1990 to 2000 and reductions in differential undercounts?

The A.C.E. Revision II estimates imply a much greater change in population coverage from 1990 to 2000 than the HUCS estimates of coverage of occupied units. These findings also apply to the estimates classified by region and tenure (for which estimates are available from 1990 and 2000).

For the population and housing classified by tenure, the A.C.E. Revision II results indicate a greater reduction in differential undercounts than the HUCS. As noted earlier, systematic differentials are not observed in 2000 for geographic areas classified by region or type of area.

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 of population in Census 2000 with the coverage results on occupied housing units based on the Housing Unit Coverage Study (HUCS).

Many studies have been conducted to assess the completeness of population coverage and identify differentials in coverage between population subgroups (for example, these studies have documented the persistent differentially higher net undercount of minorities and persons living in rental-occupied units). Other studies have assessed the completeness of housing coverage and identified differentials between areas and housing categories. No current study has assessed the consistency of patterns of population and housing coverage (see for U.S. Bureau of the Census, 2001a for evaluation of population coverage in Census 2000; see U.S. Bureau of the Census, 2001b for evaluation of housing coverage in Census 2000).

2. METHODOLOGY

This study uses the results of the A.C.E. Revision II estimates of population coverage for comparison to the housing results. The derivation of the A.C.E. Revision II estimates using the dual system estimation methodology is discussed elsewhere (see Kostanich, 2002). The A.C.E. Revision II set used in this study includes an adjustment for “correlation bias” (the term used to describe the persistent understatement of the net undercount of Black men in coverage measurement surveys relative to the net undercount measured by Demographic Analysis estimates). In brief, the A.C.E. Revision II results for females are accepted as estimated. For Blacks, the A.C.E. estimates for males are increased such that the sex ratios equal the DA sex ratios for Blacks for ages 18 and over (calculations are carried out separately for ages 18-29, 30-49, and 50+). For NonBlacks, the A.C.E. Revision II estimates for males are increased to equal the DA sex ratios for ages 30 and over (disaggregated into 30-49 and 50+). The 1990 Post Enumeration Survey (PES) does not incorporate this correlation bias adjustment.

Similarly, this study uses the results of the Housing Unit Coverage Study (HUCS) on occupied housing units for comparison to the A.C.E. Revision II results. The derivation of the HUCS estimates using the dual system estimation methodology is discussed elsewhere (see U.S. Bureau of the Census, 2001b).

We examine the agreement of the A.C.E. Revision II and HUCS undercount rates for Census 2000 in terms of measuring differences in coverage between geographic areas and demographic groups:

- Census region
- Type of area (Metropolitan/Non-Metro, type of enumeration area)
- Tenure (Renter versus Owner)
- Race/Origin (Hispanic, Non-Hispanic Black, Non-Hispanic White)
- Type of Structure (single unit, multi-unit)

We also examine the agreement of the A.C.E. Revision II and HUCS in measuring change in net census undercounts from 1990 to 2000 and reductions in differential undercounts.

3. LIMITATIONS

- * We have not tested the significance of the differences noted in this report.
- * Unlike the A.C.E. Revision II for 2000, the PES coverage estimates for 1990 have not been adjusted for correlation bias; this inconsistency would tend to understate the change in net undercount from 1990 to 2000.
- * Unlike the revision to the A.C.E., we have not revised the HUCS results subsequent to the initial March 2001 release. Thus the HUCS estimates do not incorporate any changes in the measurement of duplication or other procedures that may jointly affect the survey estimates of population and housing coverage.

4. RESULTS

This section compares the A.C.E. Revision II estimates of net census undercount of population with the HUCS estimates of net census undercount of occupied housing units. We focus on the comparisons of the patterns of coverage, that is, the agreement of the A.C.E. Revision II and HUCS in measuring differential coverage of demographic and geographic subgroups. The comparisons are first made for the total population, then for the five dimensions noted earlier (Census region, tenure, race/origin, type of area, and type of structure). The A.C.E. Revision II estimates reported here are for the household population.

Total Population and Census Region

The HUCS results measured a relatively small net undercount in both 1990 and 2000. An estimated 0.27 percent of occupied units were missed on a net basis in 2000, slightly lower than the estimate of 0.53 percent in 1990 (Table 1).

The survey-based results for population measure a small net census overcount in 2000 (A.C.E. Revision II estimate of 0.49 percent), compared to an estimated net undercount in 1990 (PES estimate of 1.61 percent). Thus the implied change in coverage of population (2.10 percentage points) is substantially greater than the implied change in coverage of occupied units (0.26 points).

The relative low net undercount of occupied housing units is common to all regions—the differences in the rates of any region are relatively small and not systematic, for either 1990 or 2000.

Unlike housing, the net undercount rates of population do exhibit a regional pattern. The net undercount rates are higher in the South and West than in the Northeast and Midwest—this

difference is more noticeable in 1990. The reduction in net undercount of population from 1990 to 2000 is common to all regions.

Table 1. Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Estimates for Housing Units from the Housing Unit Coverage Study (HUCS) and Estimates for Population from the Post-Enumeration Survey for 1990 and Accuracy and Coverage Evaluation for 2000. Standard error in parenthesis)						
Category	Pct. Net Undercount: Housing			Pct. Net Undercount: Population		
	HUCS 1990	HUCS 2000	Change: 1990-2000	PES 1990	A.C.E. Revision II 2000	Change: 1990-2000
Total	0.53 (0.21)	0.27 (0.13)	0.26	1.61 (0.20)	-0.49 (0.20)	2.10
Region						
Northeast	0.30 (0.40)	-0.14 (0.29)	0.44	0.43 (0.49)	-0.66 (0.25)	1.09
Midwest	0.65 (0.38)	0.08 (0.18)	0.57	0.62 (0.33)	-1.38 (0.20)	2.00
South	0.47 (0.30)	0.49 (0.22)	-0.02	1.92 (0.33)	-0.16 (0.23)	2.08
West	0.61 (0.55)	0.47 (0.33)	0.14	2.31 (0.36)	0.02 (0.27)	2.29

Type of Area

Estimates of net census undercount for metropolitan/nonmetropolitan areas, and for type of enumeration area, are available only for 2000. For housing coverage, no large difference is measured between the net undercount (or overcount) rates of large, medium, or small MSAs or for all other types of enumeration areas.

Similarly, no appreciable difference is found for population coverage across areas classified by metropolitan status or type of enumeration. The direction of net coverage is consistently different between housing and population, as net undercounts are measured for occupied housing and net overcounts are measured for population.

Table 2. Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Estimates for Housing Units from the Housing Unit Coverage Study (HUCS) and Estimates for Population from the Post-Enumeration Survey for 1990 and Accuracy and Coverage Evaluation for 2000. Standard error in parenthesis).

Category	Pct. Net Undercount: Housing			Pct. Net Undercount: Population		
	HUCS 1990	HUCS 2000	Change: 1990-2000	A.C.E.		Change: 1990-2000
				PES Revision II 1990	2000	
MSA and TEA						
Large MSA, Mail TEA	n.a.	0.11 (0.24)	n.a.	n.a.	-0.22 (0.24)	n.a.
Medium MSA, Mail TEA	n.a.	0.30 (0.20)	n.a.	n.a.	-0.53 (0.24)	n.a.
Small MSA /NonMSA, Mail TEA	n.a.	0.53 (0.25)	n.a.	n.a.	-0.48 (0.27)	n.a.
All other TEA	n.a.	0.22 (0.36)	n.a.	n.a.	-0.88 (0.34)	n.a.
n.a. - Not available						

Tenure

The pattern of coverage classified by tenure is similar for occupied housing units and population—the coverage of units occupied by renters and persons living in those units is lower than coverage of units occupied by owners. However, the difference is much smaller for housing. The net undercount of renter-occupied units was 0.57 percent in 2000 while the rate for owner-occupied units was 0.12 percent, a difference of 0.45 percentage points; in 1990, the net undercount of persons in renter-occupied units was estimated to be 1.14 percent whereas the rate for persons in owner-occupied units was an estimated net census overcount of 1.25 percent—a renter/owner differential of 2.39 percentage points.

Equally noteworthy is the sharper reduction in net undercount from 1990 to 2000 for persons living in renter units than those in owner units. The renter net undercount rate fell from 4.59 in 1990 to 1.14 percent in 2000 (change of 3.45 percentage points), whereas the owner rate changed from a negligible 0.04 percent undercount to a 1.25 percent net census overcount (change of 1.29 points).

Table 3. Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Estimates for Housing Units from the Housing Unit Coverage Study (HUCS) and Estimates for Population from the Post-Enumeration Survey for 1990 and Accuracy and Coverage Evaluation for 2000. Standard error in parenthesis)

Category	Pct. Net Undercount: Housing			Pct. Net Undercount: Population		
	HUCS 1990	HUCS 2000	Change: 1990-2000	A.C.E.		Change:
				PES 1990	Revision II 2000	1990-2000
Tenure						
Renter	0.80 (0.39)	0.57 (0.25)	0.23	4.59 (0.40)	1.14 (0.36)	3.45
Owner	0.37 (0.21)	0.12 (0.12)	0.25	0.04 (0.21)	-1.25 (0.20)	1.29
Difference: Renter relative to owner Differential (Renter)	0.43	0.45	x	4.55	2.39	x

Race/Origin

Estimates of net undercounts of housing for race and origin categories are available only for 2000 and represent the race or origin of the householder.

Unlike the general similarity of housing and population coverage patterns for other classifications, the Census 2000 results show a surprising and different pattern of coverage by minority/nonminority status. Specifically, the estimates of population coverage based on the A.C.E. Revision II (2000) and PES (1990) exhibit the “expected” differentially higher net undercount rates of minority groups (estimates for Hispanics and Non-Hispanic Blacks are shown below) compared to Non-Hispanic Whites. For housing coverage in 2000, however, the reverse pattern is found—the HUCS estimated net overcounts of occupied housing units where the householder was Black and estimated net undercounts of Non-Hispanic White householders.

For Non-Hispanic Black householders, the net census overcount rate for housing (0.45 percent) contrasts to the net undercount rate for Non-Hispanic Whites (0.38 percent). For Hispanics, the net undercount rate (0.06) is slightly below the rate for White householders.

For population subgroups, the net undercount rates in 2000 for Hispanics (0.71 percent) and Non-Hispanic Blacks (1.84 percent) are appreciably higher than the rate for Non-Hispanic Whites (net overcount of 1.13 percent). Compared to the corresponding rates for 1990, however, the estimates show that the differential undercounts have been reduced.

Table 4. Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000 (Estimates for Housing Units from the Housing Unit Coverage Study (HUCS) and Estimates for Population from the Post-Enumeration Survey for 1990 and Accuracy and Coverage Evaluation for 2000. Standard error in parenthesis)

Category	Pct. Net Undercount: Housing			Pct. Net Undercount: Population		
	HUCS 1990	HUCS 2000	Change: 1990-2000	A.C.E.		Change:
				PES 1990	Revision II 2000	1990-2000
Race/Origin						
Hispanic	n.a.	0.06 (0.35)	n.a.	4.68 (0.73)	0.71 (0.44)	3.97
Non-Hispanic Black	n.a.	-0.45 (0.29)	n.a.	4.18 (0.45)	1.84 (0.43)	2.34
Non-Hispanic White	n.a.	0.38 (0.14)	n.a.	0.59 (0.21)	-1.13 (0.20)	1.72
Difference: Hispanic or Non-Hispanic Black relative to Non-Hispanic White						
Hispanic	n.a.	-0.32	x	4.09	1.84	x
Non-Hispanic Black	n.a.	-0.83	x	3.59	2.97	x
n.a. - Not available						

Type of Structure

Like the race/origin variable, the housing and population data on coverage classified by type of structure are available for all cells in 2000 but only for a limited number in 1990 to make comparisons.

For occupied housing units, the HUCS results indicate a net census undercount of single units (0.62 percent) and net census overcount of multiunits (0.65 percent). The estimated 1.30 percent net census overcount of small multiunits (2-9 units) contrasts to the estimated 2.11 percent net undercount of small multiunits in 1990.

The A.C.E. Revision II estimates measure a different pattern by type of structure, with a net census overcount of single units (0.64 percent) and slight net undercount of multiunits (0.05 percent). The A.C.E. Revision II measures a much greater reduction in the net census undercount of multiunits from 1990 to 2000 (3.81 percentage points) compared to the change for single units (1.06 percentage points); comparable data are not available from the HUCS.

Table 5. Comparison of Net Census Coverage Rates of Occupied Housing Units and Population: 1990 and 2000(Estimates for Housing Units from the Housing Unit Coverage Study (HUCS) and Estimates for Population from the Post-Enumeration Survey for 1990 and Accuracy and Coverage Evaluation for 2000. Standard error in parenthesis)

Category	Pct. Net Undercount: Housing			Pct. Net Undercount: Population		
	HUCS 1990	HUCS 2000	Change: 1990-2000	PES 1990	A.C.E. Revision II 2000	Change: 1990-2000
Type of Structure						
Single Unit	n.a.	0.62 (0.13)	n.a.	0.42 (0.19)	-0.64 (0.19)	1.06
Multi-unit	n.a.	-0.65 (0.32)	n.a.	3.86 (0.48)	0.05 (0.31)	3.81
Small Multiunit (2-9 units)	2.11 (0.59)	-1.30 (0.48)	3.41	n.a.	-0.35 (0.30)	
Large Multiunit (10+ units)	n.a.	-0.08 (0.43)	n.a.	n.a.	0.43 (0.32)	
Difference: Single unit relative to Multi-unit Differential (Single unit)	n.a.	1.27	x	n.a.	-0.69	x
n.a. - Not available						

6. REFERENCES

Kostanich, Donna. 2002. "A.C.E. Revision II: Design and Methodology", DSSD A.C.E. Revision II Memorandum Series #PP-30.

U.S. Bureau of the Census. 2001a. "ESCAP II: Accuracy and Coverage Evaluation: Demographic Analysis results", by J. Gregory Robinson. *Executive Steering Committee For A.C.E. Policy II, Report No. 1*, October 13.

U.S. Bureau of the Census. 2001b. "ESCAP II: Census 2000 Housing Coverage Study", by Diane F. Barrett, Michael Beaghen and Damon Smith. *Executive Steering Committee For A.C.E. Policy II, Report No. 17*, October 17.