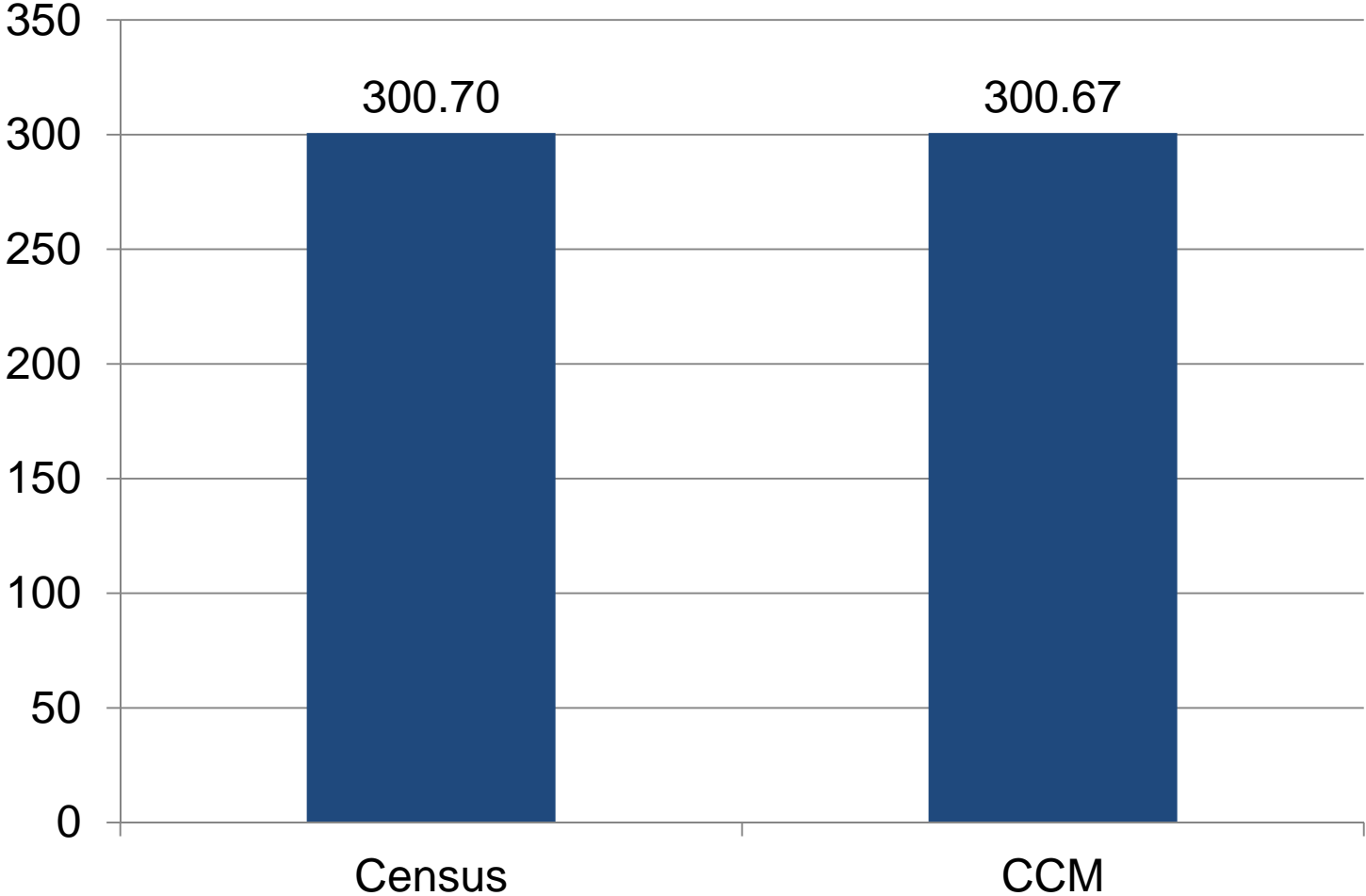


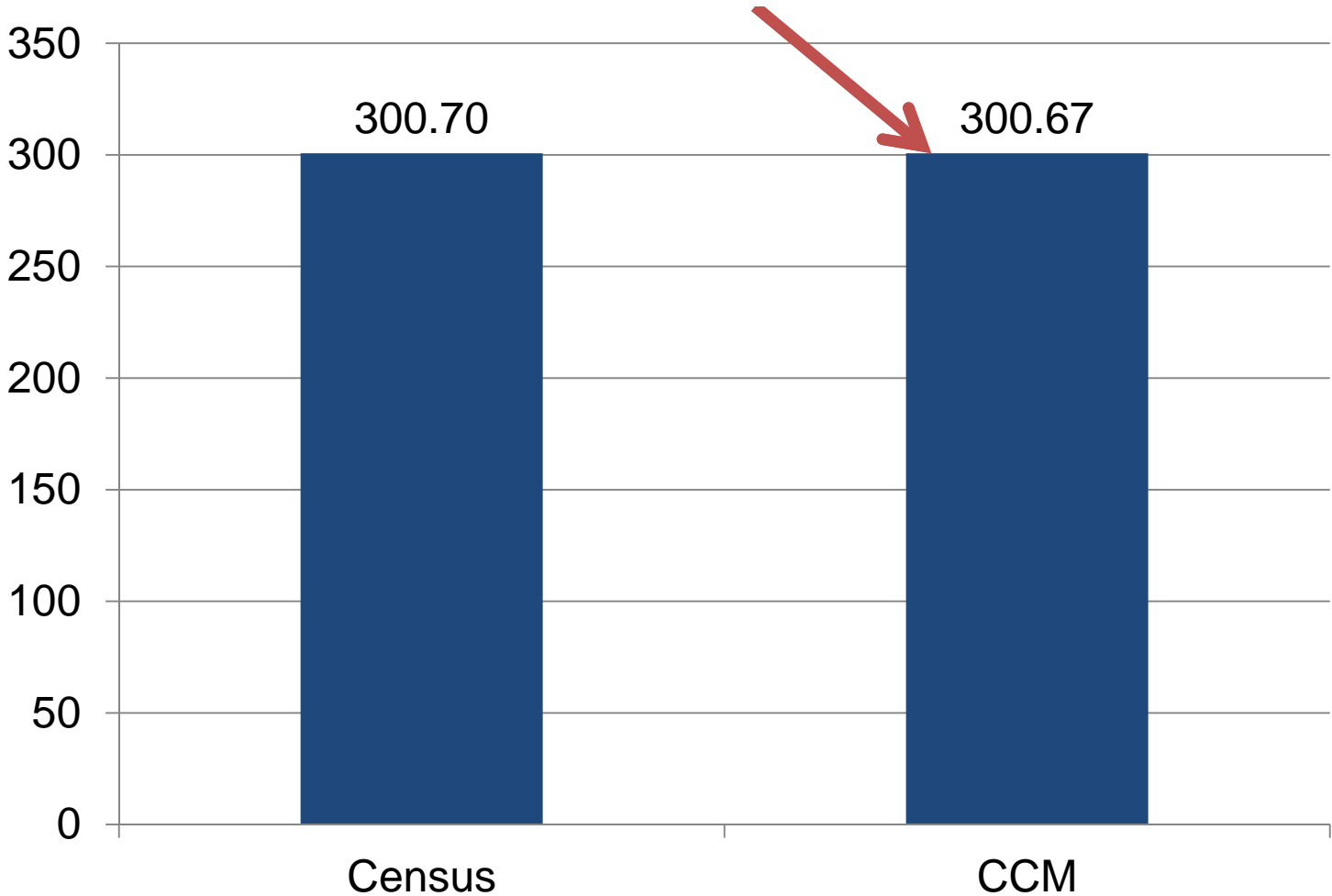
CCM Estimation Methodology and Additional Results

Thomas Mule, U.S. Census Bureau

Census Count and the CCM Estimate (Level, in Millions)



Census Count and the CCM Estimate (Level, in Millions)



Dual System Estimation

- Capture/Recapture Approach
- Citations
 - Peterson (1896)
 - Sekar and Deming (1949)
 - Wolter (1986)
 - Hogan (1993)
 - Census Bureau, A.C.E. Design & Meth. (2004)

Dual System Estimation

		Enumerated in PES ? (P Sample)		
		YES	NO	Total
Correctly Enumerated in Census ? (E sample)	YES	N_{11}	N_{12}	N_{1+}
	NO	N_{21}	N_{22}	N_{2+}
	Total	N_{+1}	N_{+2}	N

Dual System Estimation

Logistic Regression

CCM using logistic regression instead of post-stratification

- Haberman, Jiang and Spencer (1998), Griffin (2005), Mule and Olson (2005), Mule (2008)

Logistic regression

- Include variables as main effects
- Do not need to include any unnecessary interactions
- Include more variables

Independent Variables for Person Logistic Regression Models

Race and Hispanic Origin (7)

Age/Sex Groups (9)

Tenure

Region

Metropolitan Statistical Area/ Type of Enumeration Area

Participation Rate

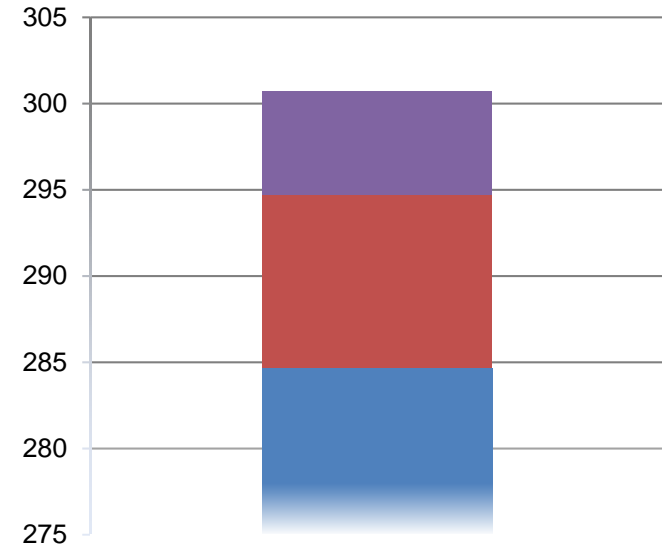
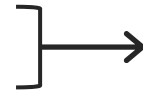
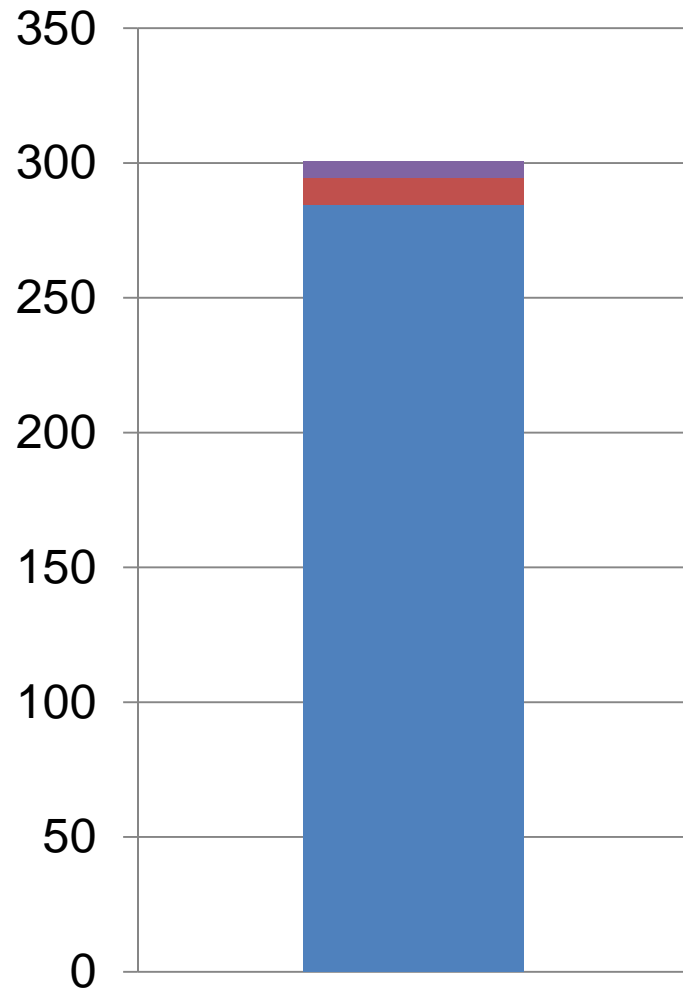
Spouse Present

Relationship to Householder

Replacement Mailing Areas

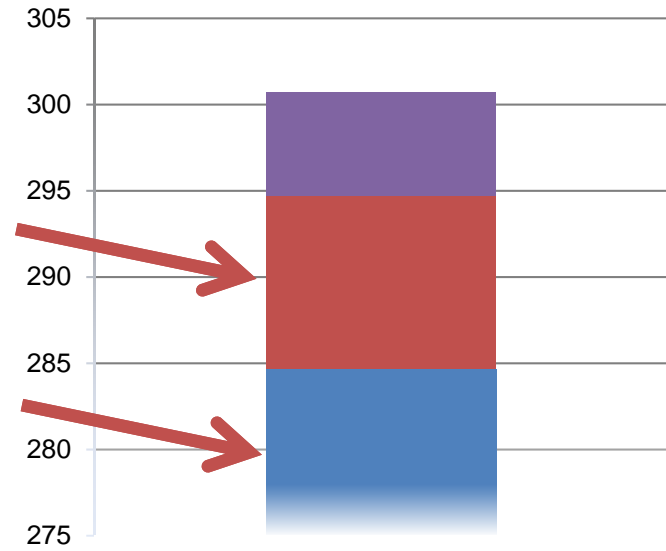
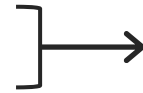
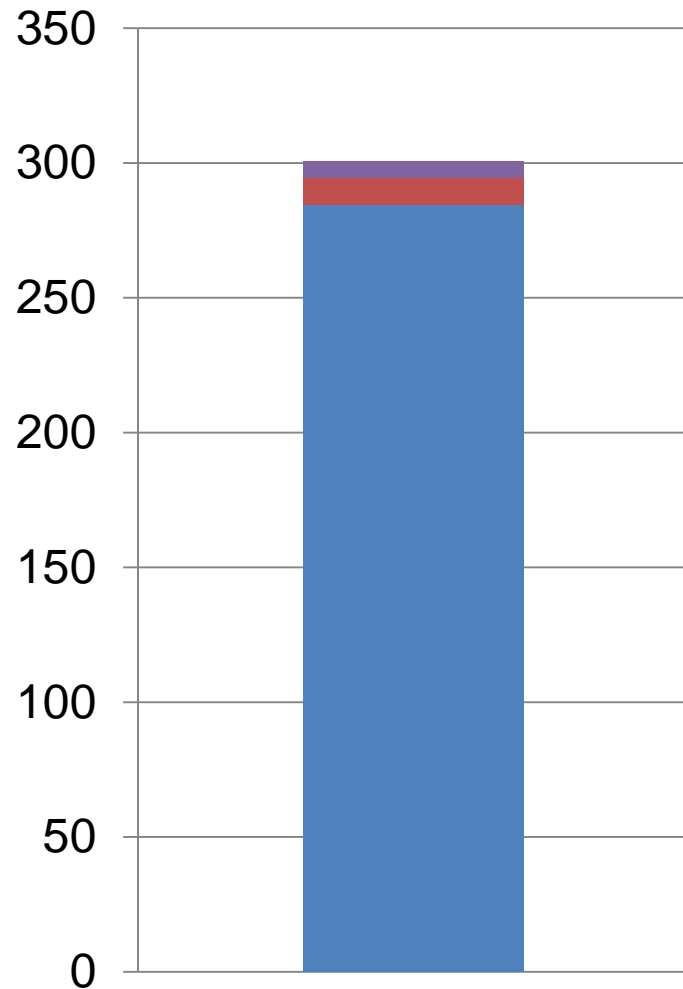
Bilingual Mail Areas

National Components of the Census Count



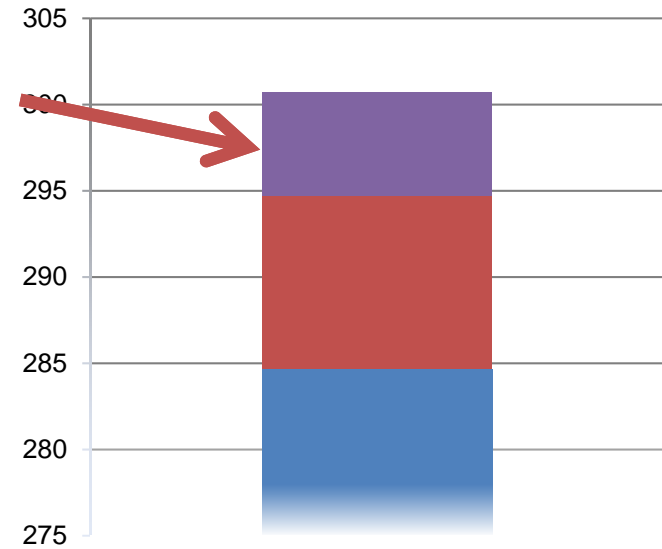
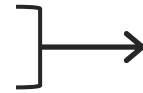
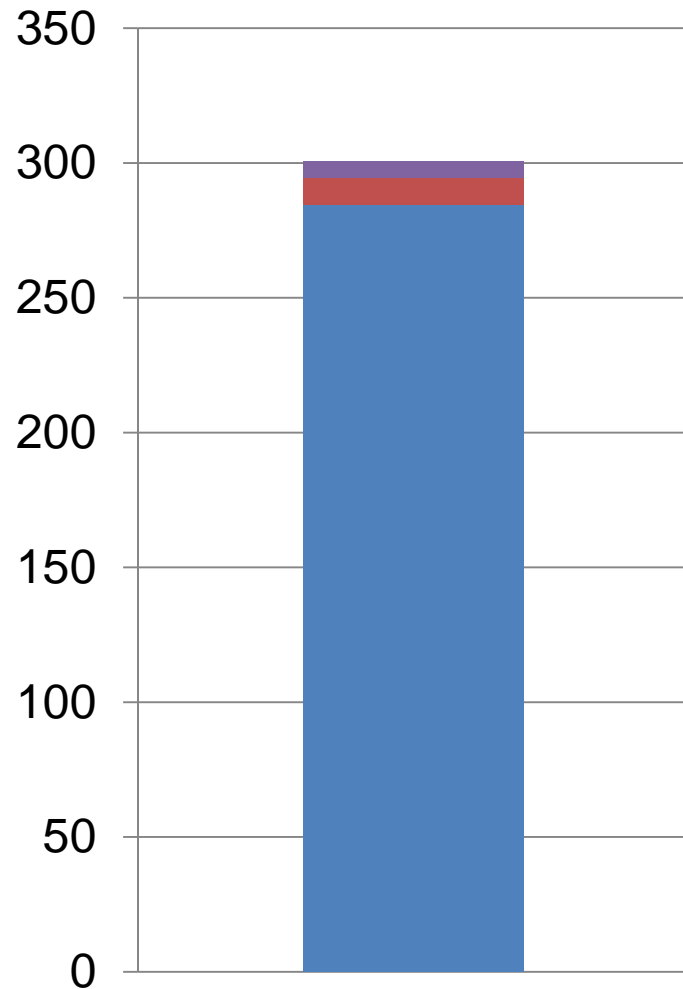
- Whole-Person Census Imputations
- Erroneous Enumerations
- Correct Enumerations

National Components of the Census Count



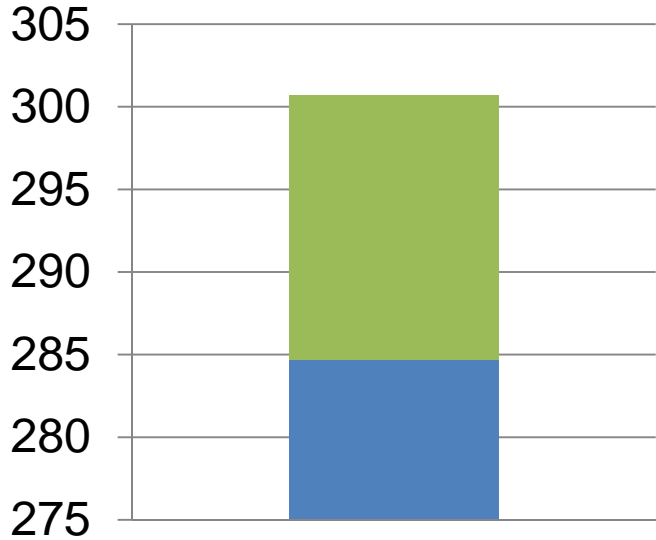
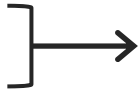
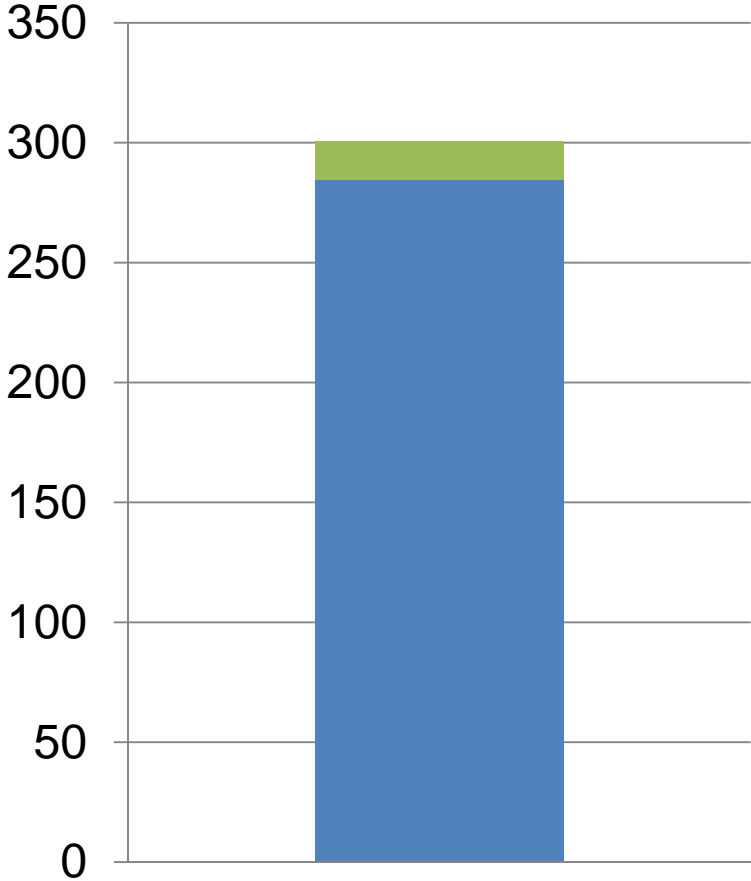
- Whole-Person Census Imputations
- Erroneous Enumerations
- Correct Enumerations

National Components of the Census Count



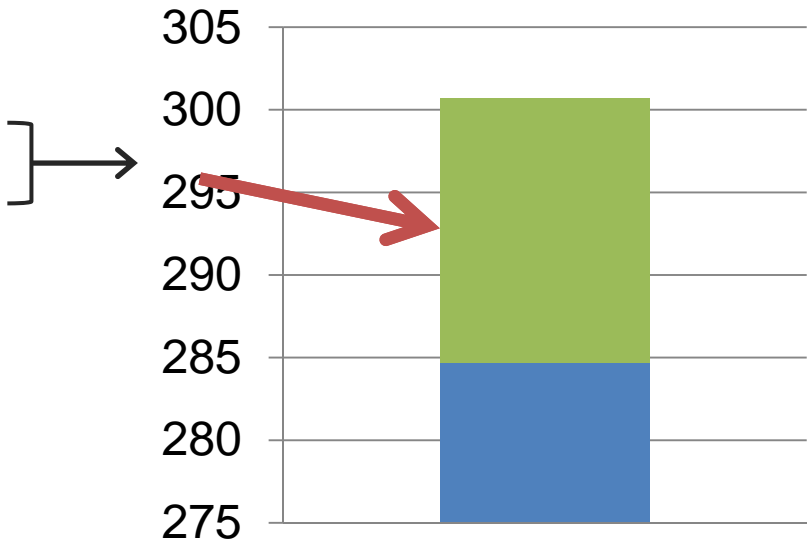
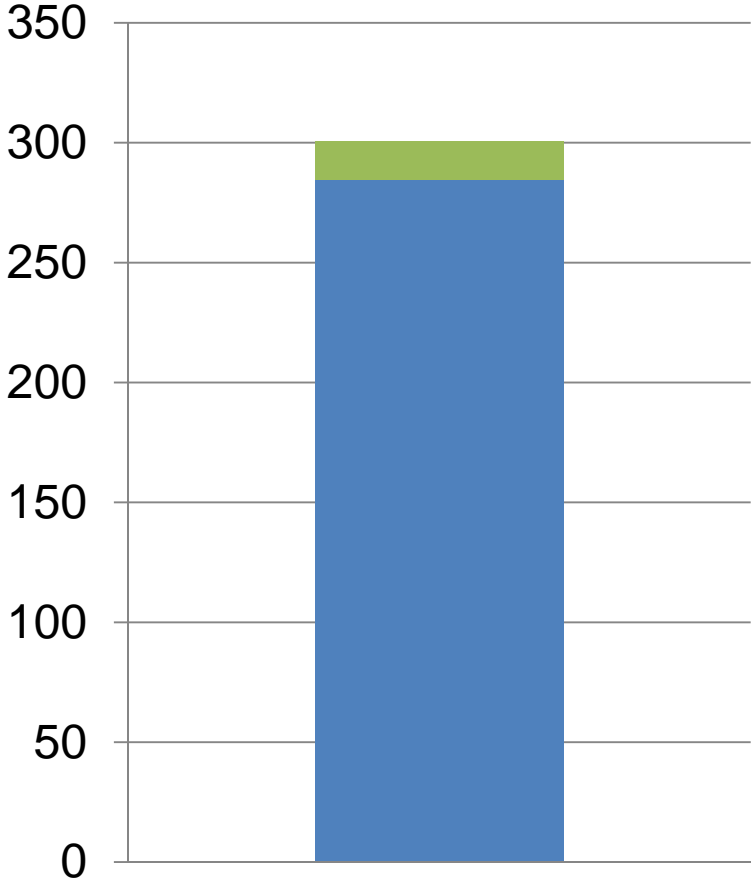
- Whole-Person Census Imputations
- Erroneous Enumerations
- Correct Enumerations

National Components of the CCM Estimate



- Omissions
- Correct Enumerations

National Components of the CCM Estimate



Additional Results

Person Duplication

2010: 8.5 million (2.8%)

2000: 6.6 million (2.1%)

Person Erroneous Enumerations Due to Duplication Between Housing Units

	2000		2010	
	Count	Percent	Count	Percent
Within Collection Block	2,907	0.97	3,801	1.26
Within Collection Tract, Different Block	625	0.21	1,018	0.34
Within County, Different Tract	1,210	0.40	1,649	0.55
Within State, Different County	664	0.22	852	0.28
Different State	549	0.18	686	0.23
Total	5,955	1.98	8,006	2.66

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Person Erroneous Enumerations Due to Duplication Between Housing Units and Group Quarters

	2000		2010	
	Count	Percent	Count	Percent
Within Collection Block	73	0.02	41	0.01
Within Collection Tract, Different Block	42	0.01	16	0.01
Within County, Different Tract	219	0.07	138	0.05
Within State, Different County	190	0.06	237	0.08
Different State	92	0.03	83	0.03
Total	616	0.20	515	0.17

Person Erroneous Enumerations Due to Duplication Between Housing Units and Group Quarters

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Total	616	0.20	515	0.17

Race and Hispanic Origin

→ NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this census, Hispanic origins are not races.

5. Is this person of Hispanic, Latino, or Spanish origin?

- No, not of Hispanic, Latino, or Spanish origin
- Yes, Mexican, Mexican Am., Chicano
- Yes, Puerto Rican
- Yes, Cuban
- Yes, another Hispanic, Latino, or Spanish origin — *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.* ↘

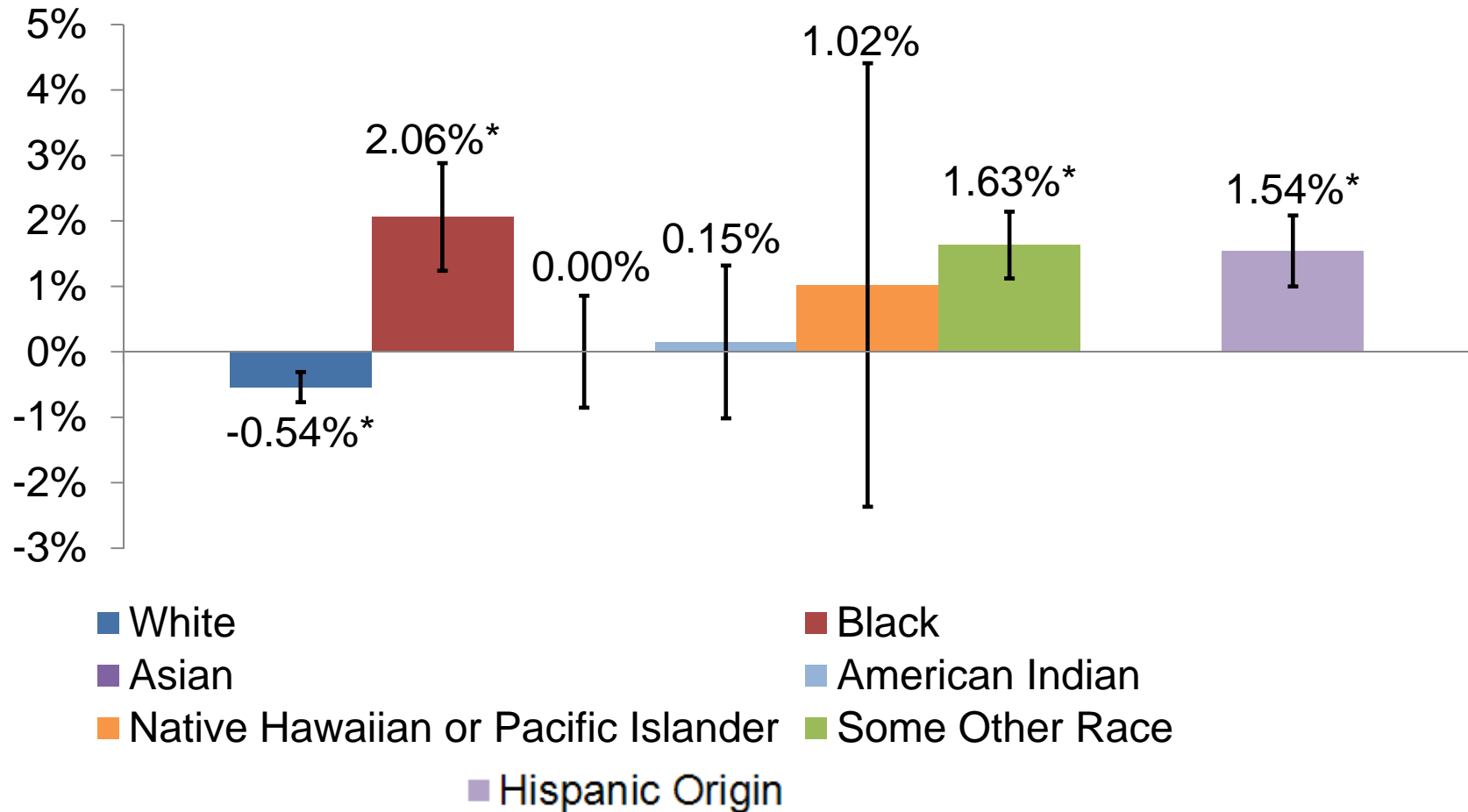
6. What is this person's race? Mark one or more boxes.

- White
- Black, African Am., or Negro
- American Indian or Alaska Native — *Print name of enrolled or principal tribe.* ↘

- | | | |
|---|--|--|
| <input type="checkbox"/> Asian Indian | <input type="checkbox"/> Japanese | <input type="checkbox"/> Native Hawaiian |
| <input type="checkbox"/> Chinese | <input type="checkbox"/> Korean | <input type="checkbox"/> Guamanian or Chamorro |
| <input type="checkbox"/> Filipino | <input type="checkbox"/> Vietnamese | <input type="checkbox"/> Samoan |
| <input type="checkbox"/> Other Asian — <i>Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.</i> ↘ | <input type="checkbox"/> Other Pacific Islander — <i>Print race, for example, Fijian, Tongan, and so on.</i> ↘ | |

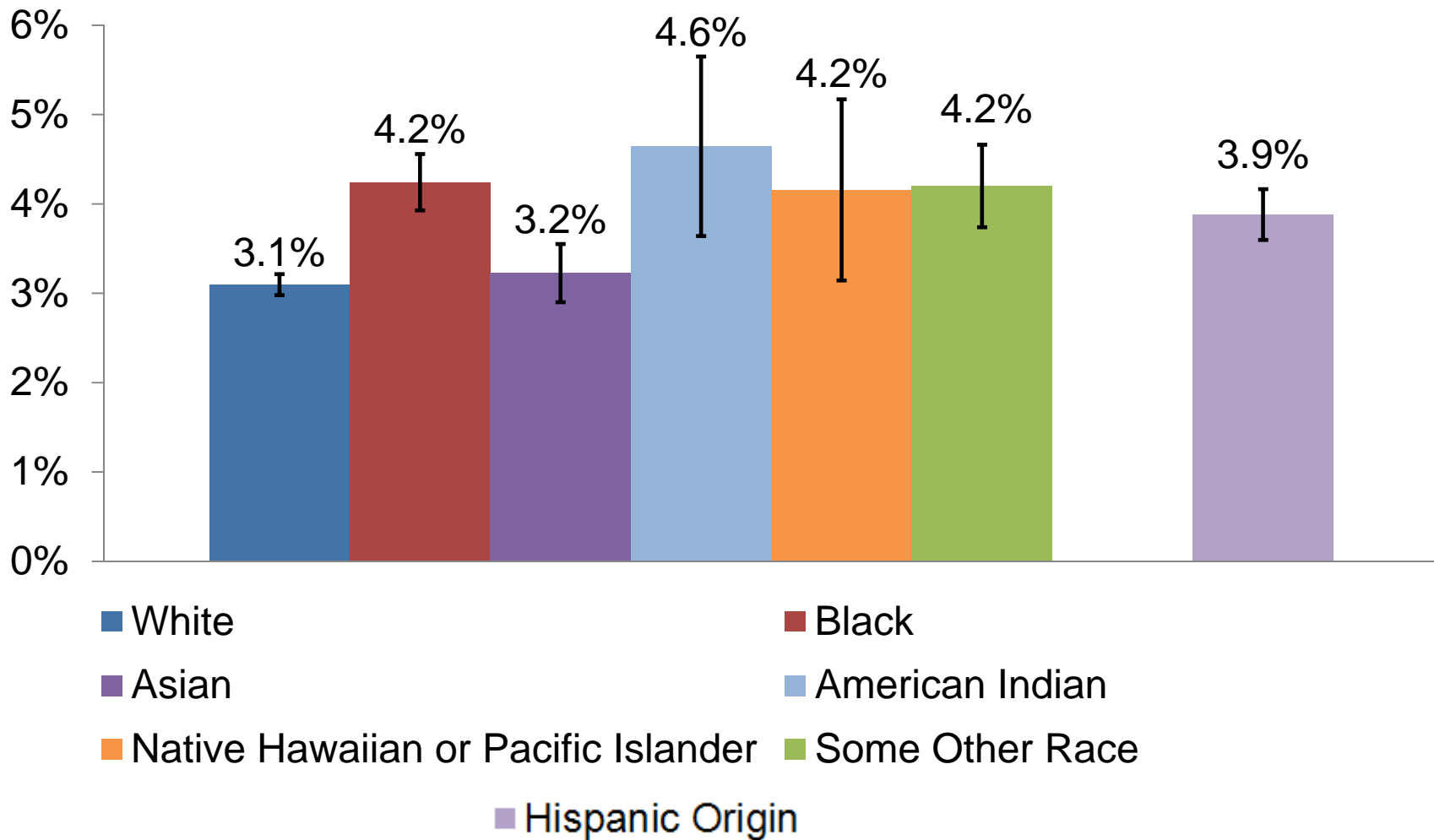
- Some other race — *Print race.* ↘

Percentage Net Undercount by Race Alone or in Combination and Hispanic Origin

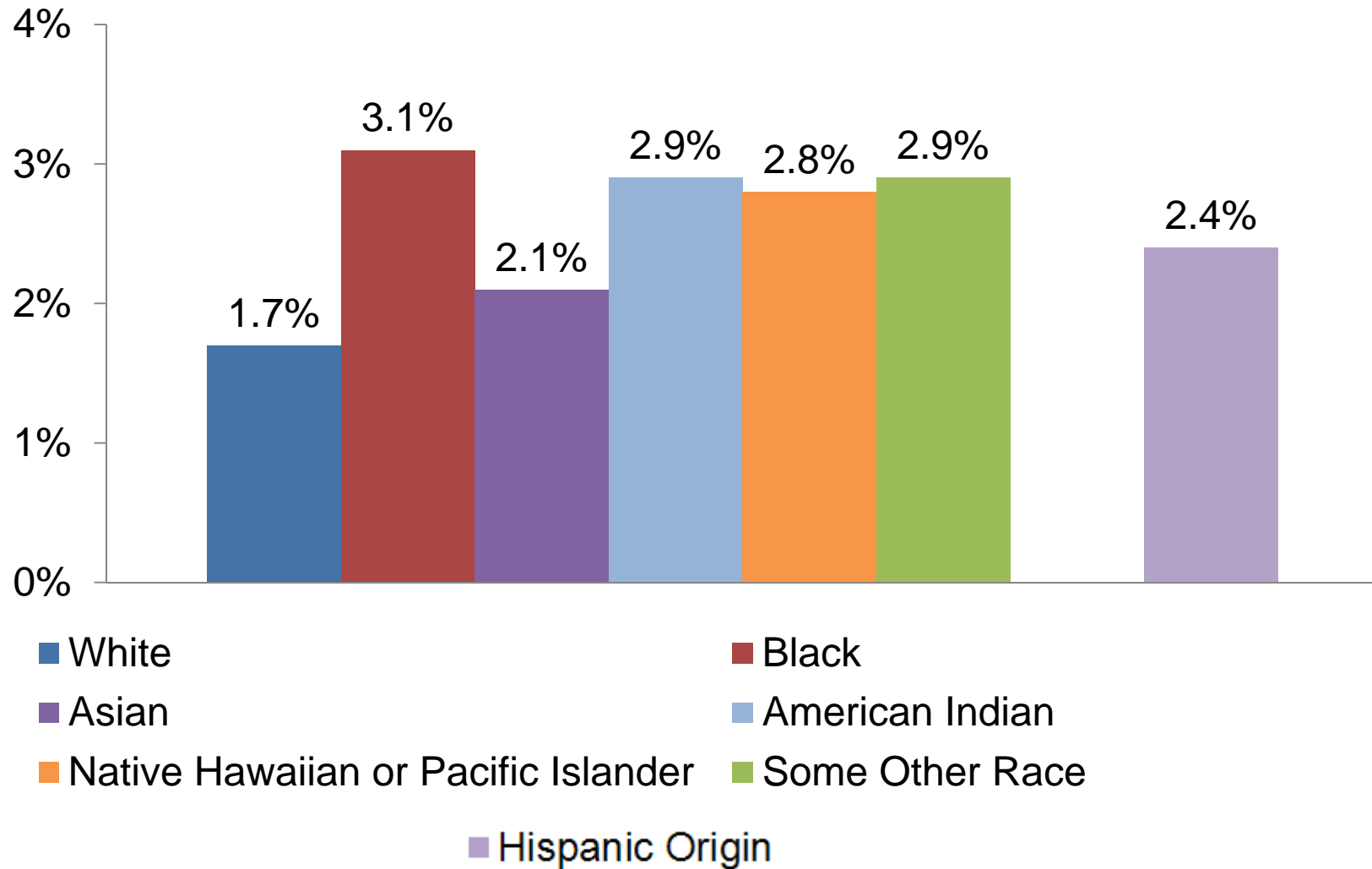


* Statistically significantly different from zero

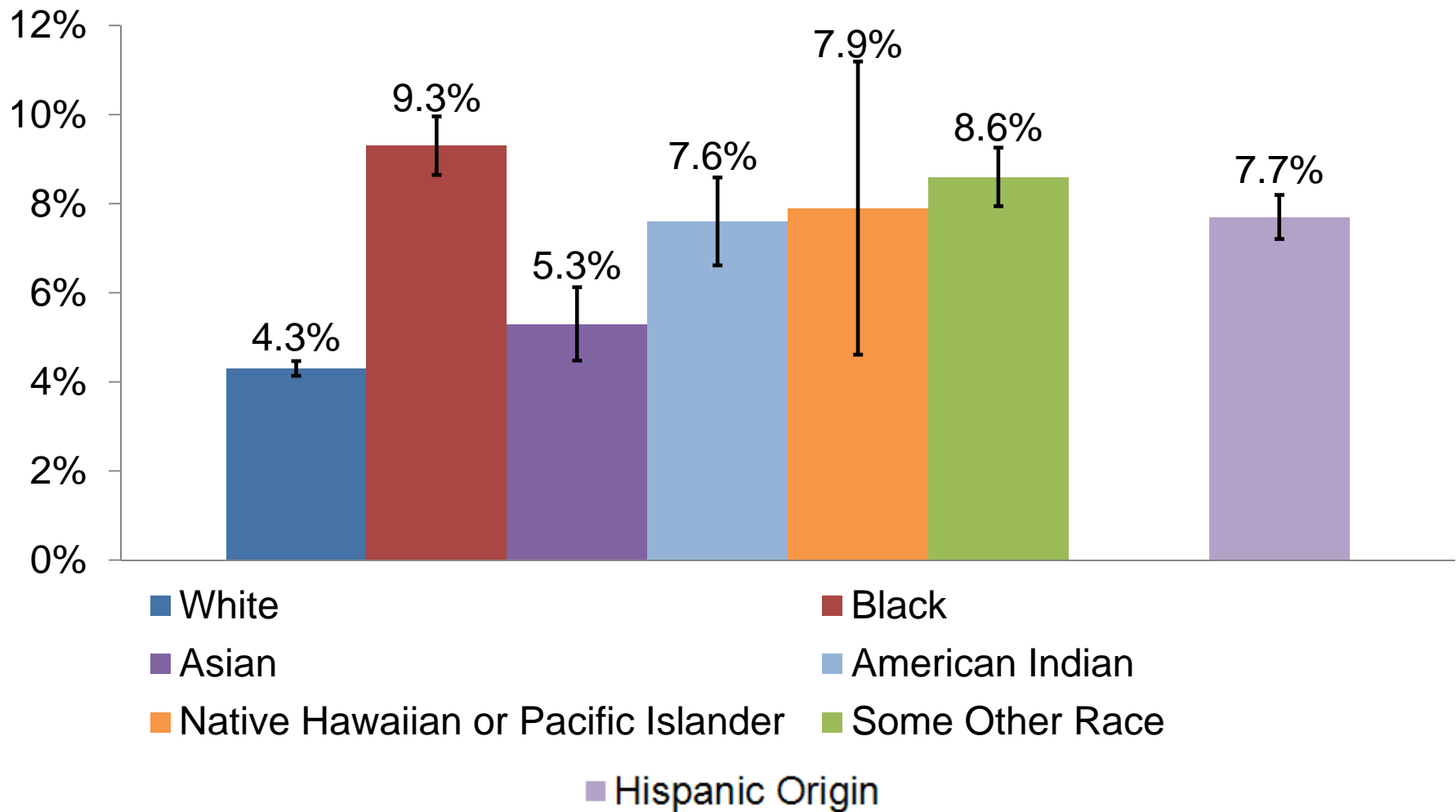
Erroneous Enumerations by Race Alone or in Combination and Hispanic Origin



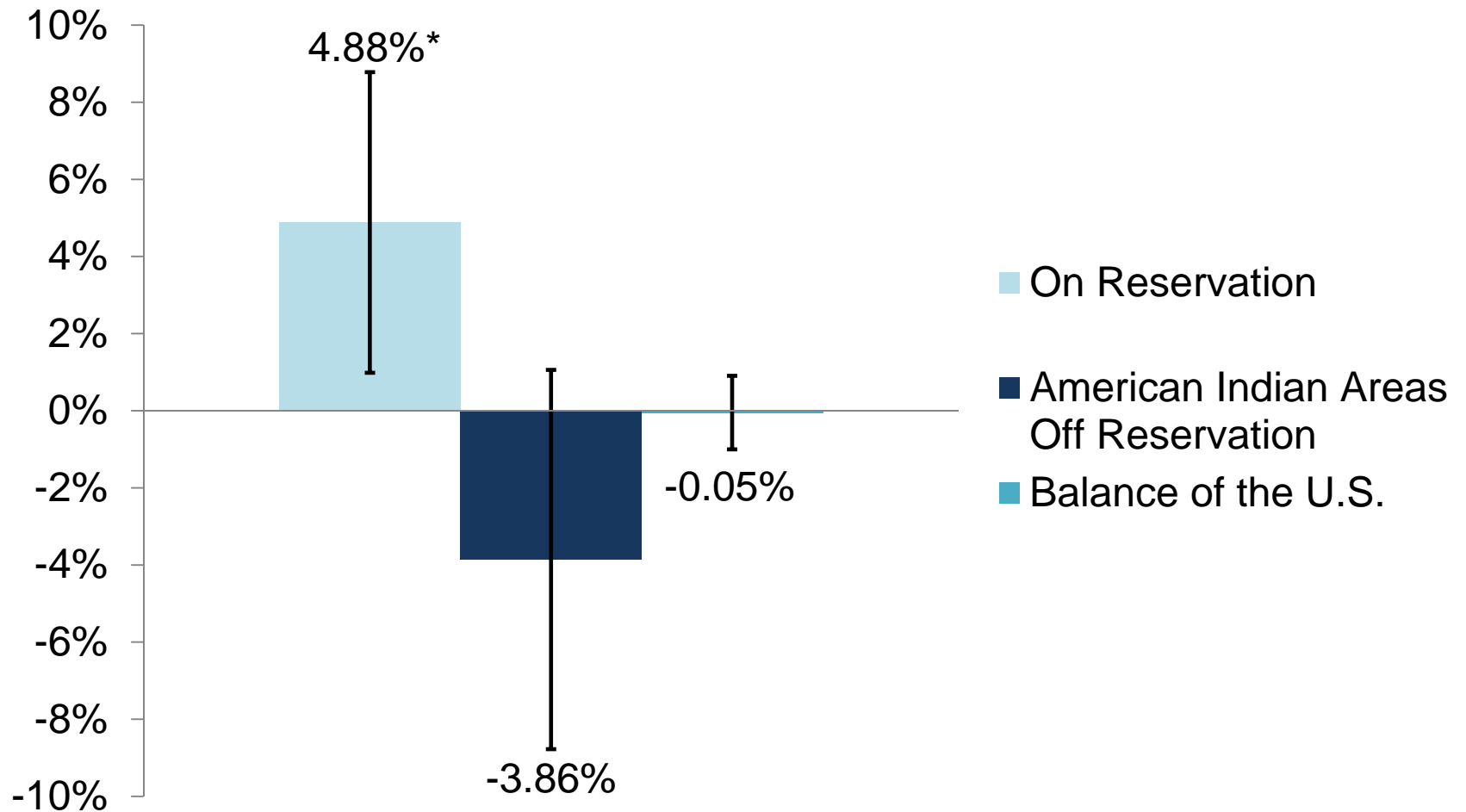
Whole-Person Census Imputations by Race Alone or in Combination and Hispanic Origin



Omissions by Race Alone or in Combination and Hispanic Origin

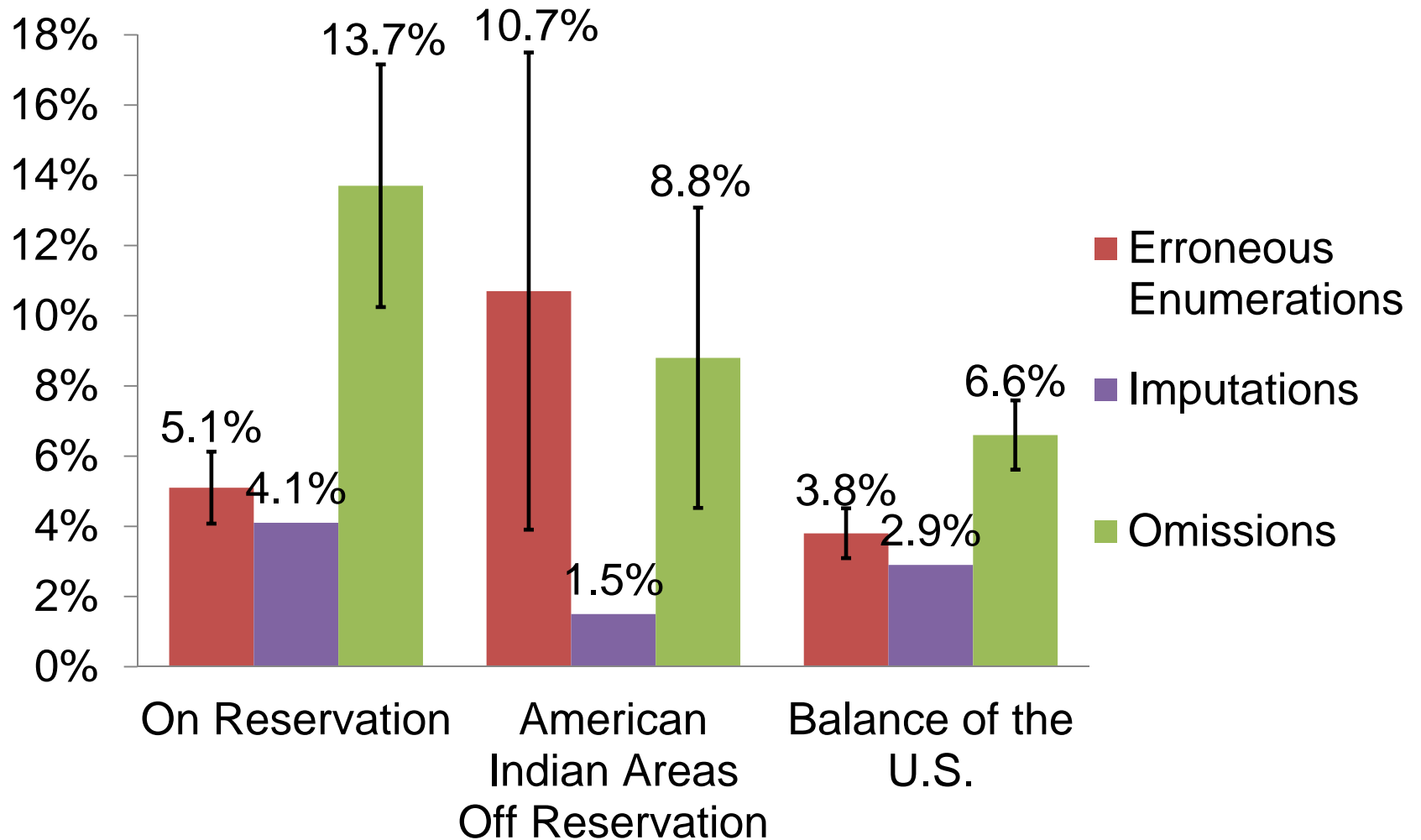


Percentage Net Undercount for American Indian and Alaskan Native Alone or in Combination by Geographic Area



* Statistically significantly different from zero

Components of the Census Coverage for American Indian and Alaskan Native Alone or in Combination

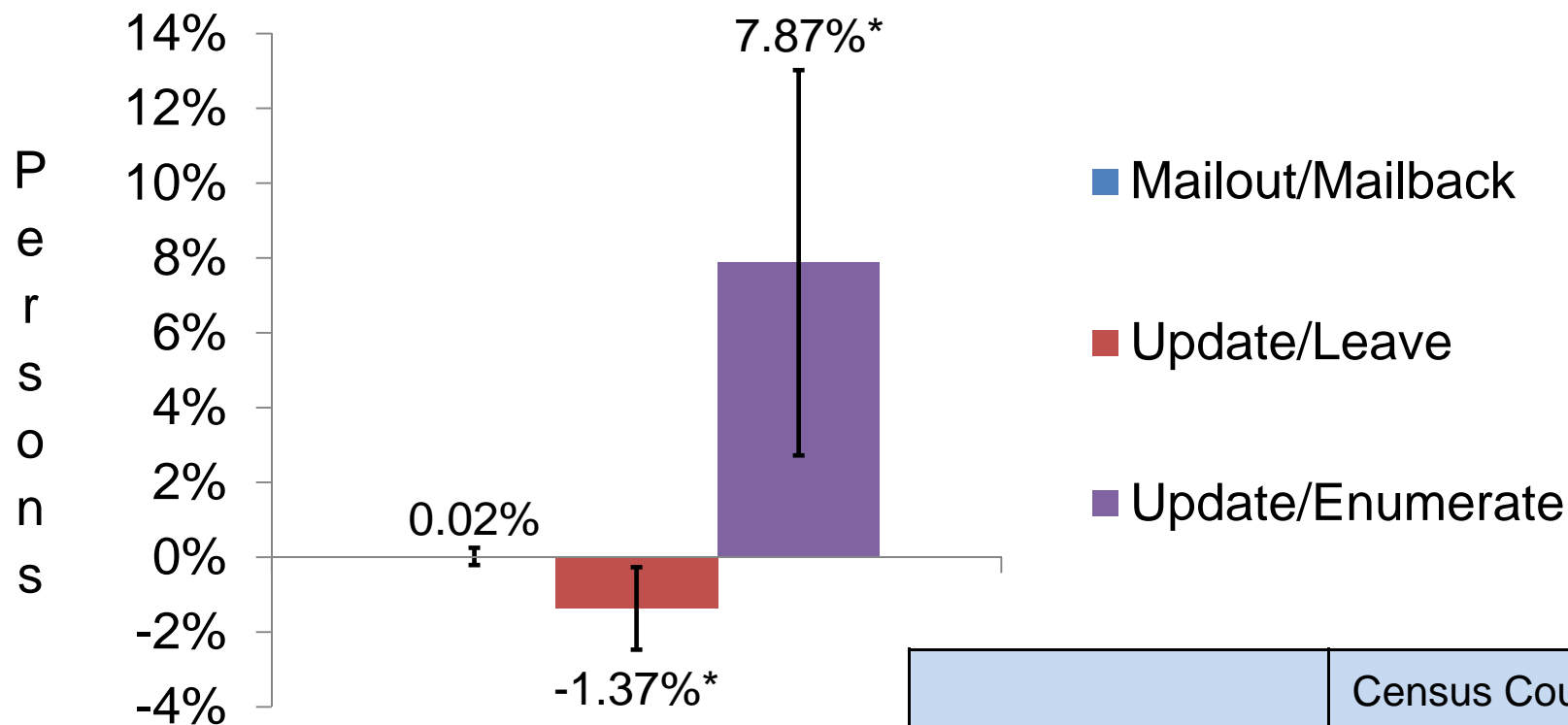


Type of Enumeration Areas

- Mailout/Mailback
- Update/Leave
- Update/Enumerate

	Count (Thousands)	Percent
	278,553	92.6%
	20,076	6.7%
	2,074	0.7%

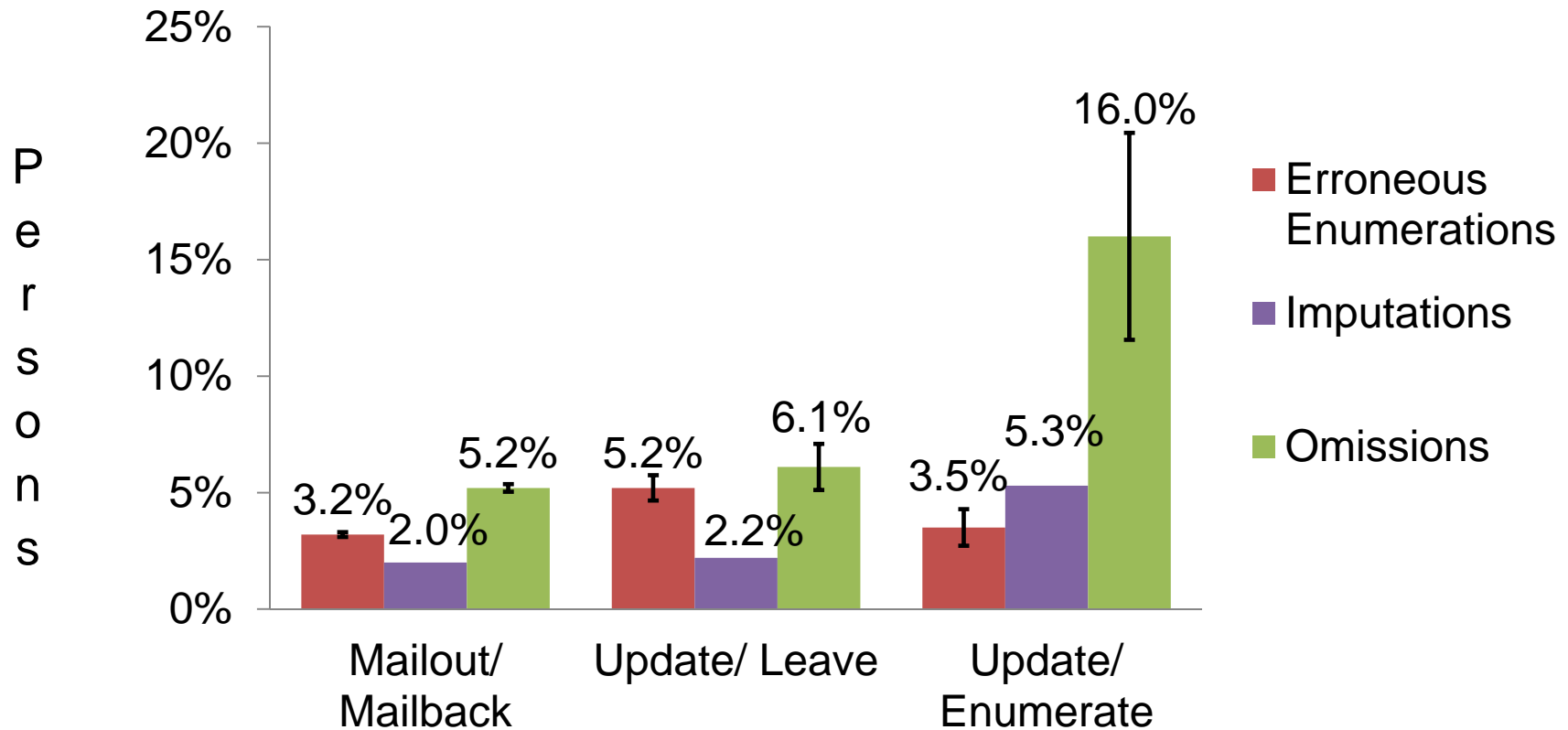
Percentage Net Undercount for Persons by Type of Enumeration Area



	Census Count
Mailout/Mailback	278.6M
Update/Leave	20.1M
Update/Enumerate	2.1M

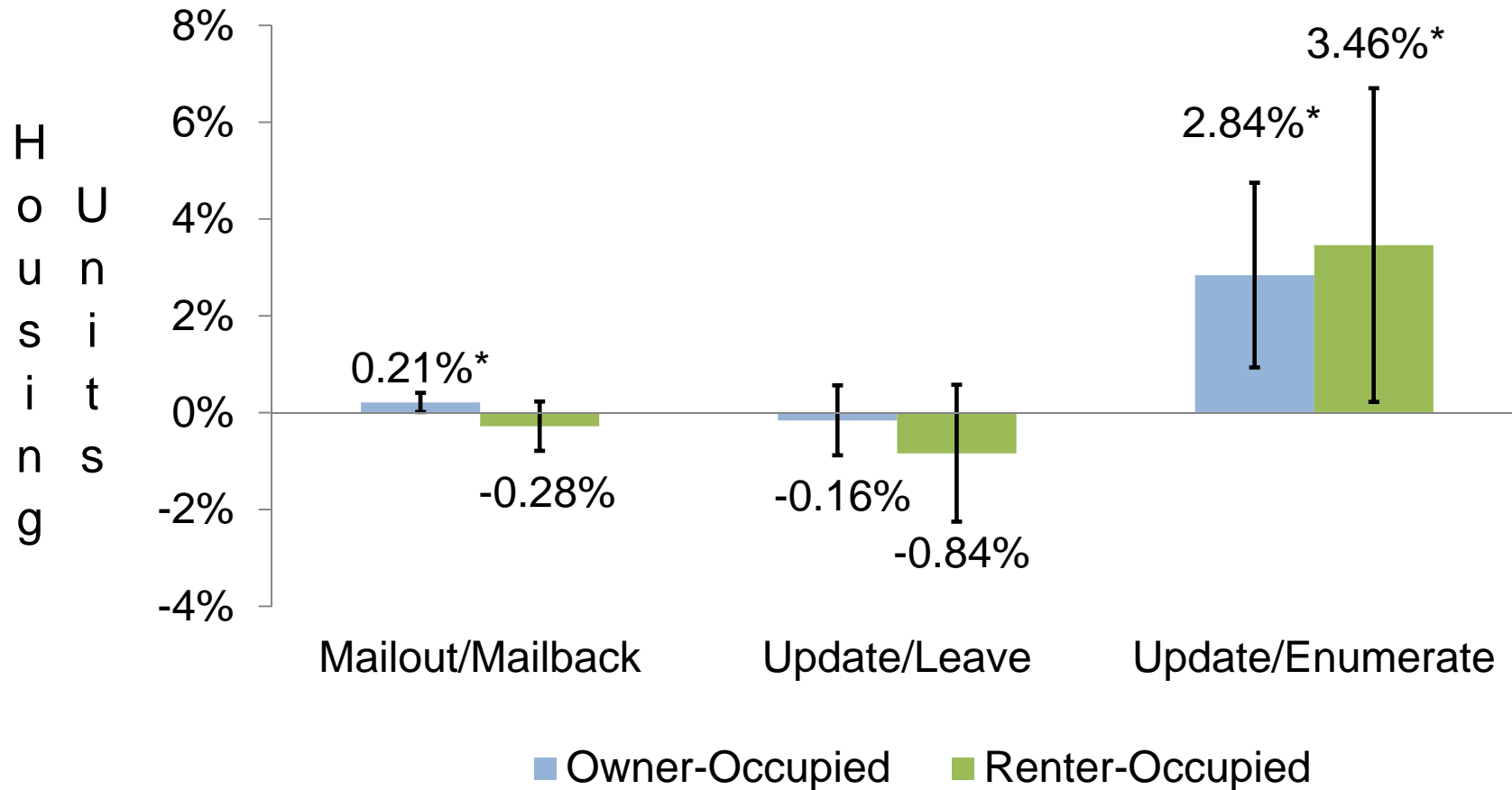
* Statistically significantly different from zero

Components of Census Coverage in 2010 by Type of Enumeration Area for Persons (Percentages)



	Census Count
Mailout/Mailback	278.6M
Update/Leave	20.1M
Update/Enumerate	2.1M

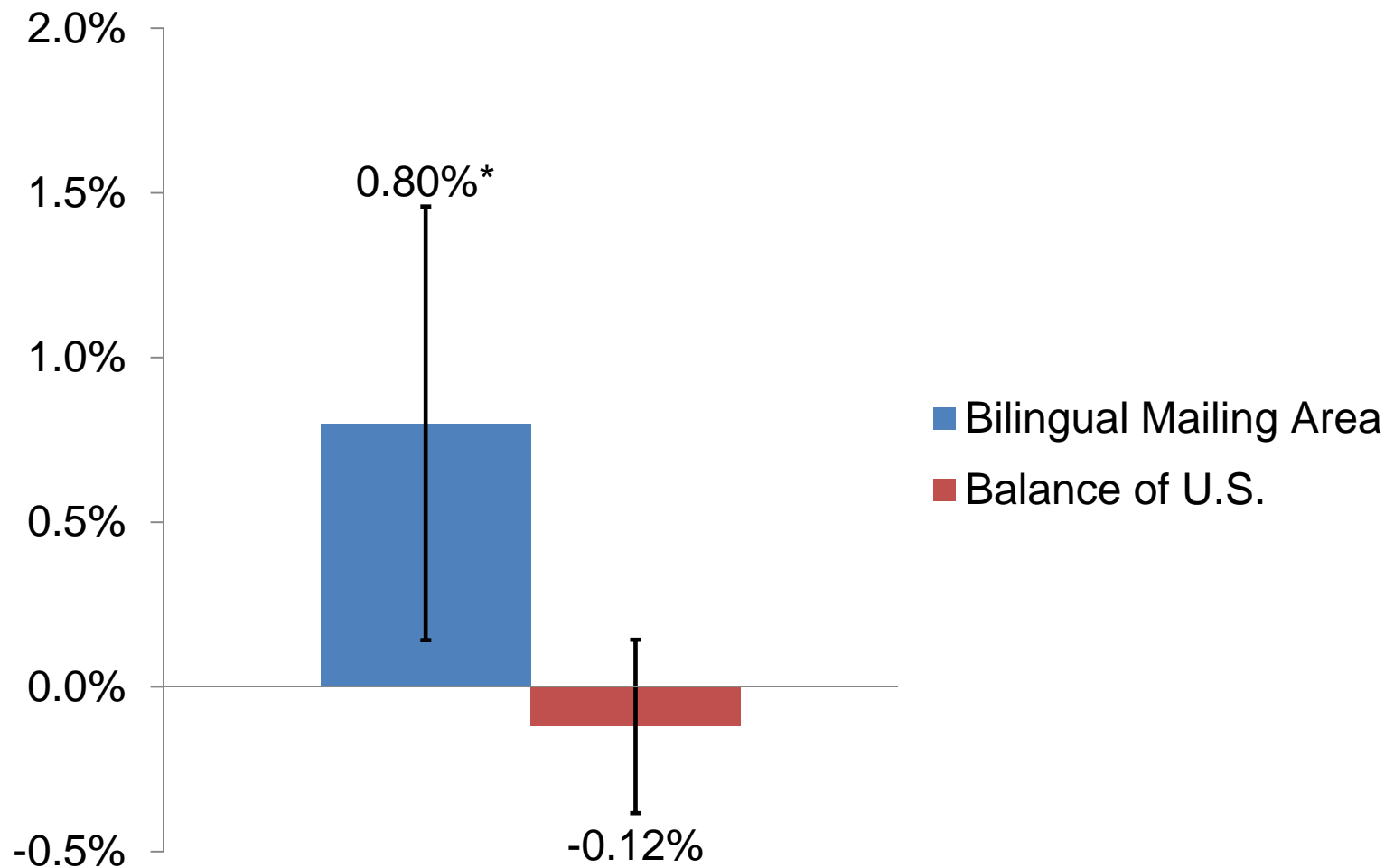
Percentage Net Undercount for Occupied Housing Units by Type of Enumeration Area and Tenure



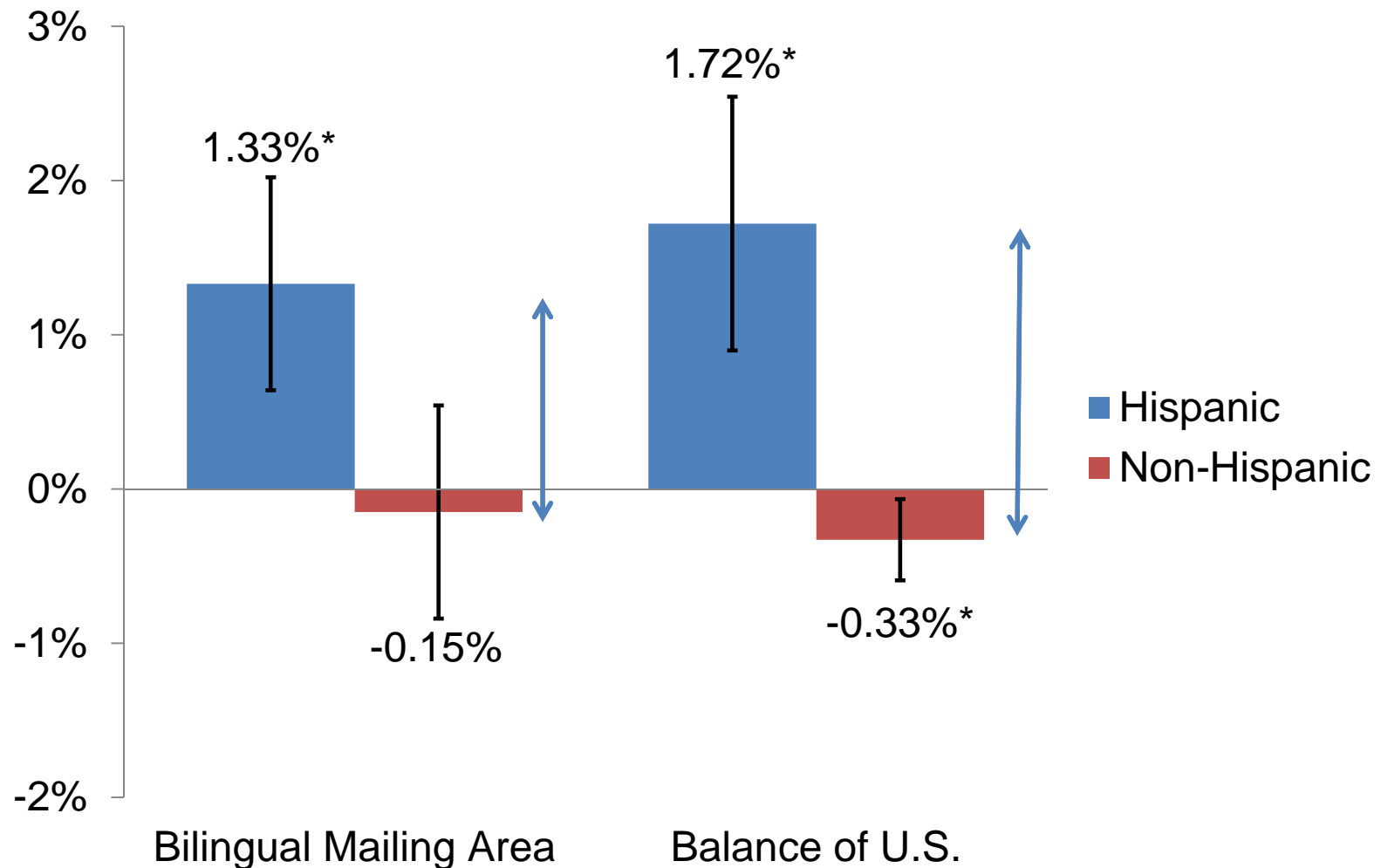
* Statistically significantly different from zero

Bilingual Mailing Areas

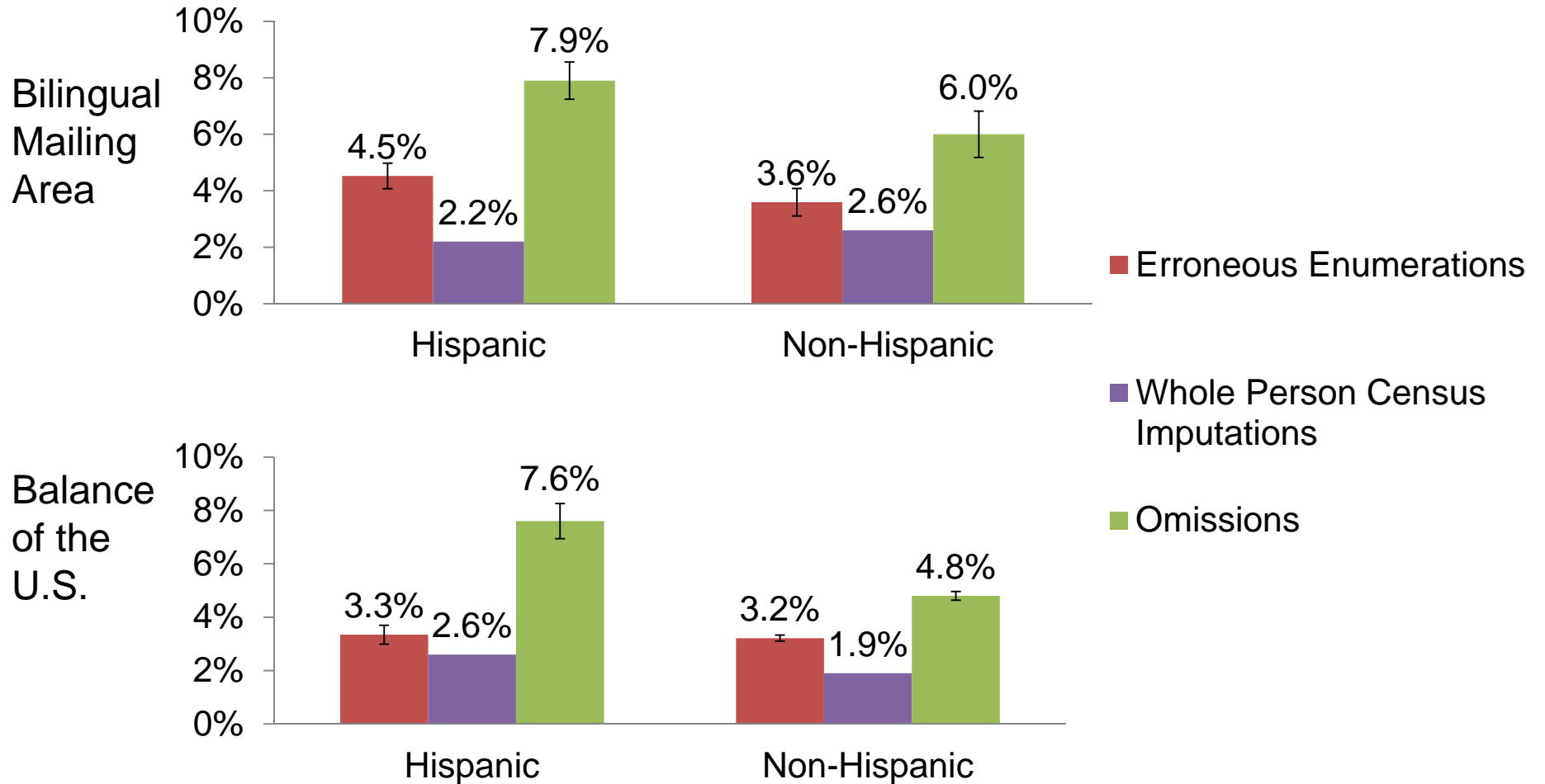
Percent Undercount by Bilingual Mailing Areas for Persons



Percent Undercount by Bilingual Mailing Areas by Hispanic Origin for Persons



Components of Census Coverage by Bilingual Mailing Area for Persons



Nonresponse Followup Operation

4 Field Operations

- NRFU
- NRFU Vacant/Delete Check
- NRFU Reinterview
- NRFU Residual

NRFU VDC Field Operation

4 Field Operations

- NRFU
- NRFU Vacant/Delete Check
- NRFU Reinterview
- NRFU Residual

NRFU VDC Field Operation

4 Field Operations

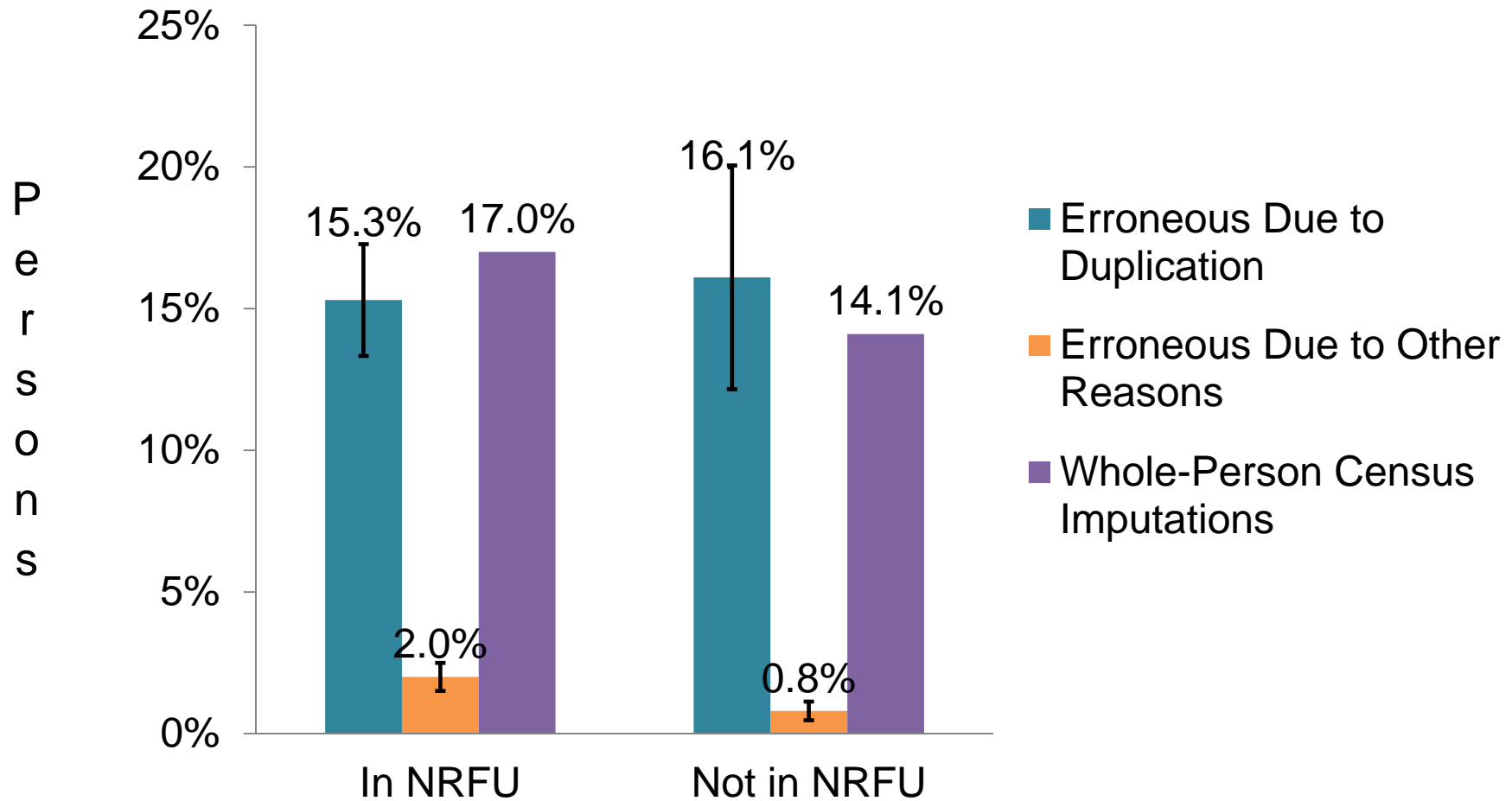
- NRFU
- NRFU Vacant/Delete Check
- NRFU Reinterview
- NRFU Residual

NRFU VDC Field Operation

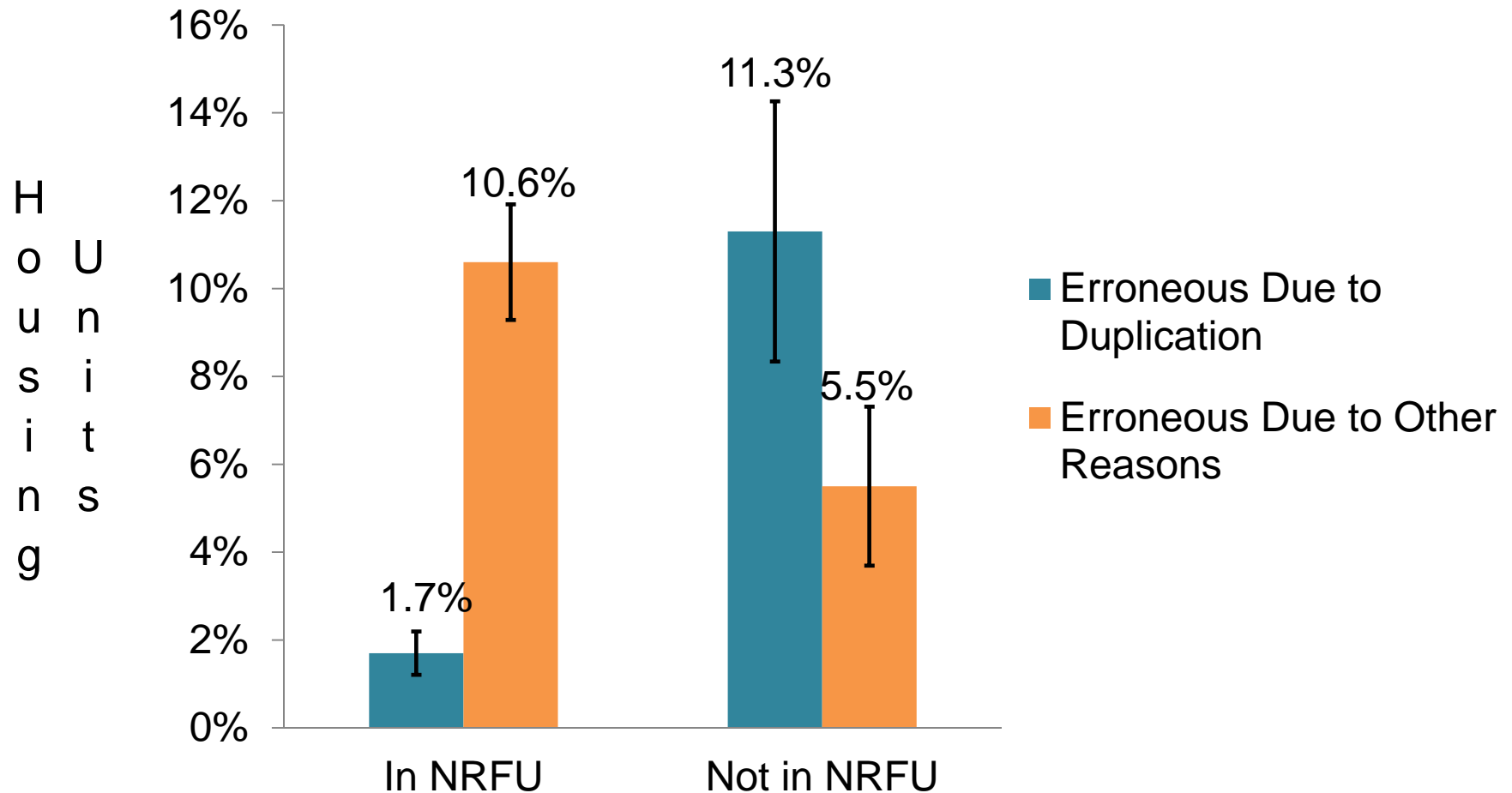
4 Field Operations

- NRFU
- NRFU Vacant/Delete Check
- NRFU Reinterview
- NRFU Residual

Components of Census Coverage for Vacant Delete Check by NRFU Field Operation Status – Persons



Components of Census Coverage for Vacant Delete Check by Nonresponse Followup Operation Status – Housing Units



Coverage Followup

Overcount Coverage Question

7. Does this person sometimes live or stay somewhere else?

No Yes — Mark all that apply.

<input type="checkbox"/> In college housing	<input type="checkbox"/> For child custody
<input type="checkbox"/> In the military	<input type="checkbox"/> In jail or prison
<input type="checkbox"/> At a seasonal or second residence	<input type="checkbox"/> In a nursing home
	<input type="checkbox"/> For another reason

Show results for some of the possible answers

Coverage Followup

Overcount Coverage Probe

7. Does this person sometimes live or stay somewhere else?

No Yes — Mark all that apply.

- | | |
|--|---|
| <input checked="" type="checkbox"/> In college housing | <input type="checkbox"/> For child custody |
| <input type="checkbox"/> In the military | <input type="checkbox"/> In jail or prison |
| <input type="checkbox"/> At a seasonal or second residence | <input type="checkbox"/> In a nursing home |
| | <input type="checkbox"/> For another reason |

Coverage Followup

Overcount Coverage Probe

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No Yes — Mark all that apply.

In college housing

For child custody

In the military

In jail or prison

At a seasonal
or second residence

In a nursing home

For another reason

Coverage Followup

Overcount Coverage Probe

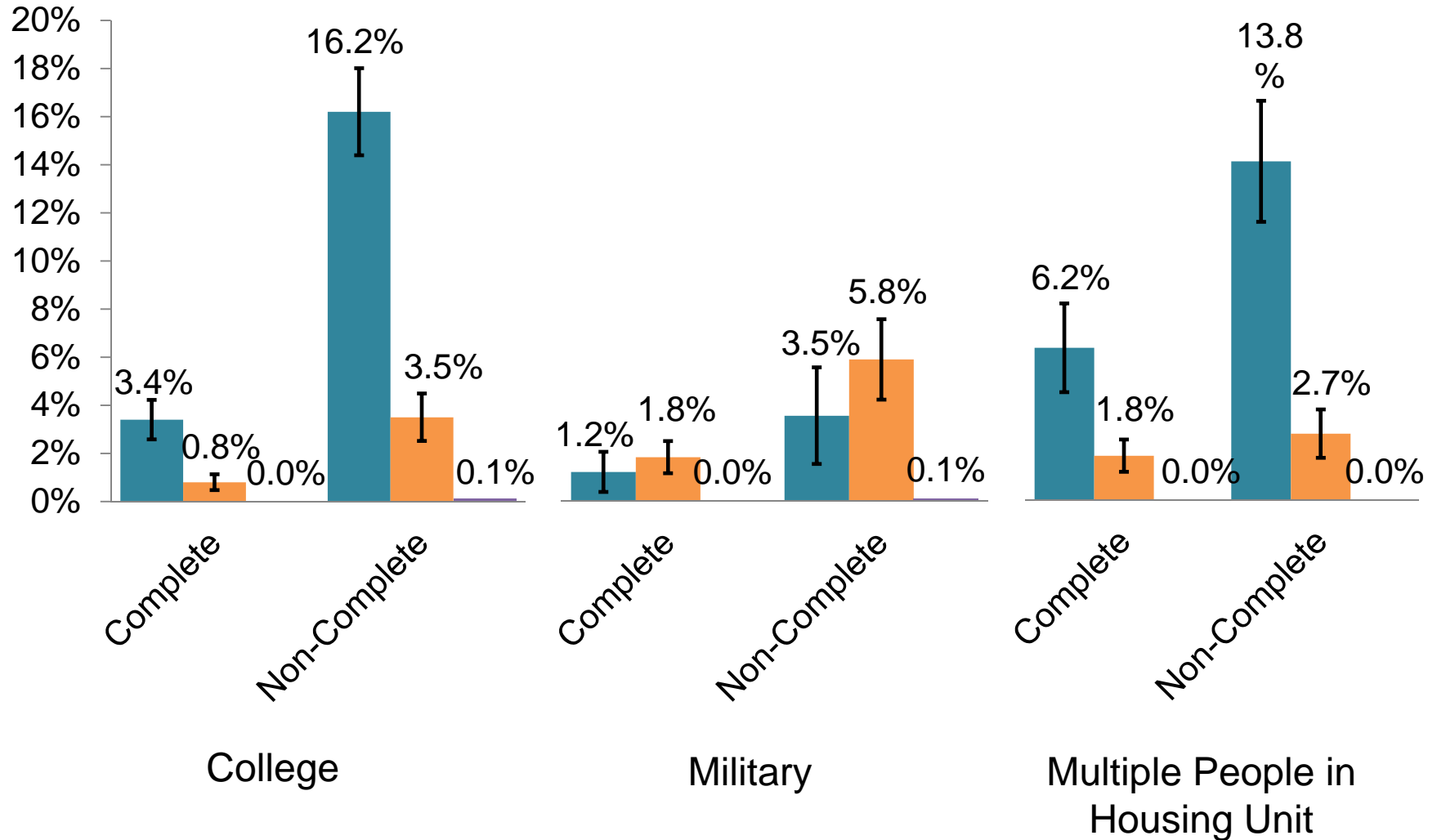
7. Does this person sometimes live or stay somewhere else?

No Yes — Mark all that apply.

<input type="checkbox"/> In college housing	<input type="checkbox"/> For child custody
<input type="checkbox"/> In the military	<input type="checkbox"/> In jail or prison
<input type="checkbox"/> At a seasonal or second residence	<input type="checkbox"/> In a nursing home
	<input type="checkbox"/> For another reason

“Yes” for multiple people in housing unit

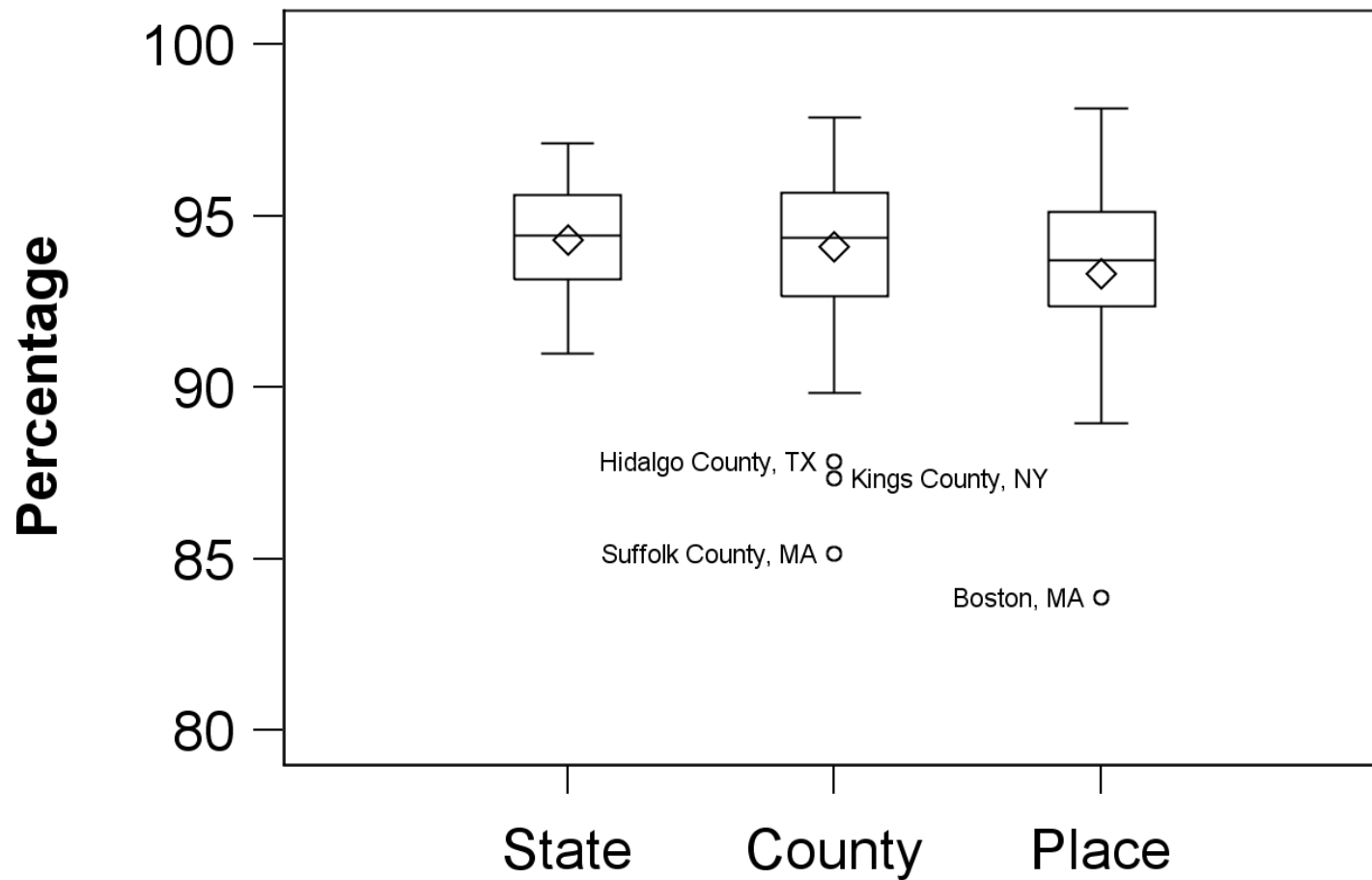
Components of Census Coverage by CFU Overcount Question Household Status



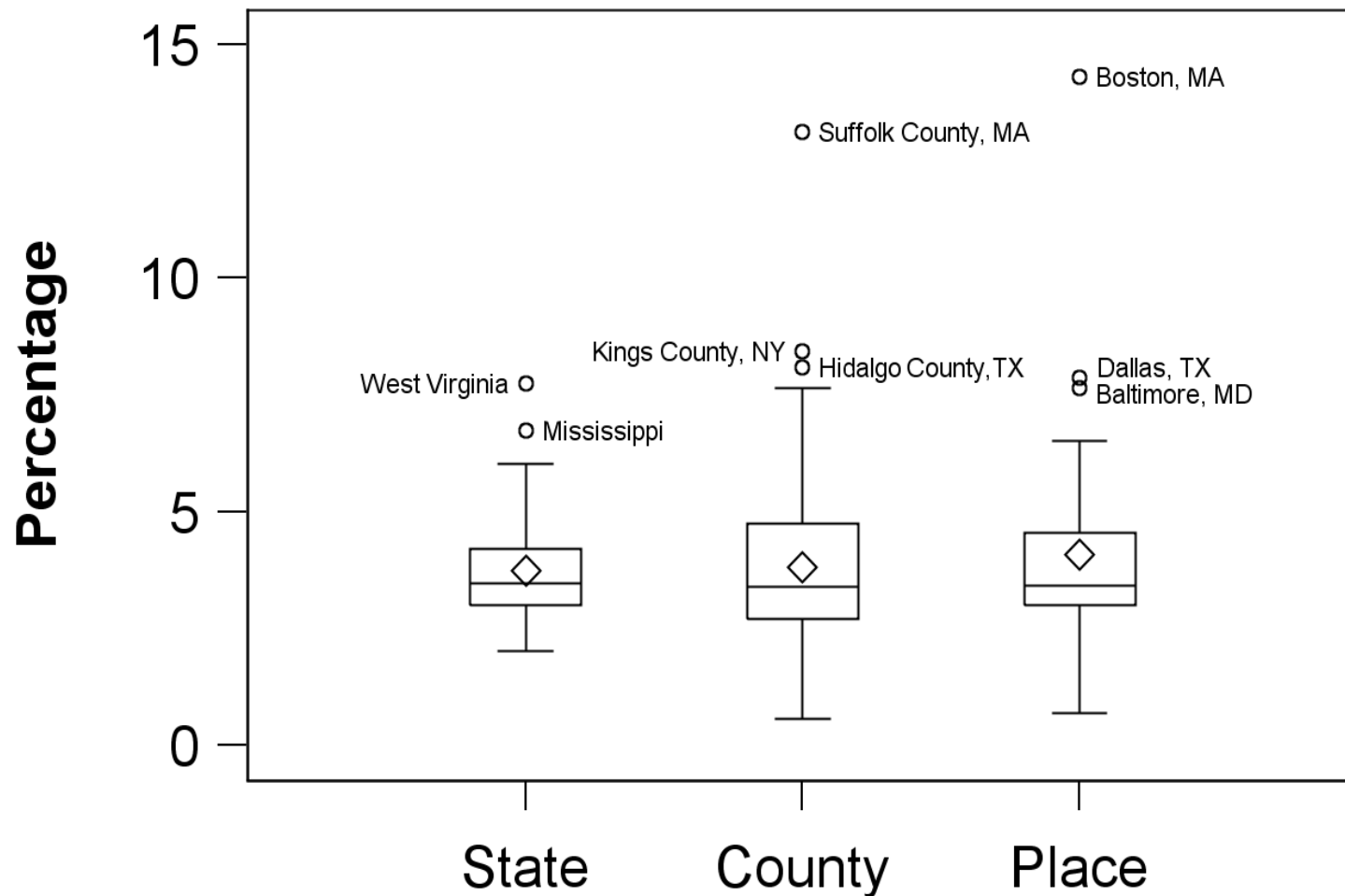
Components of Census Coverage for Persons Governmental Entities

- States
- Counties and Places over 500,000

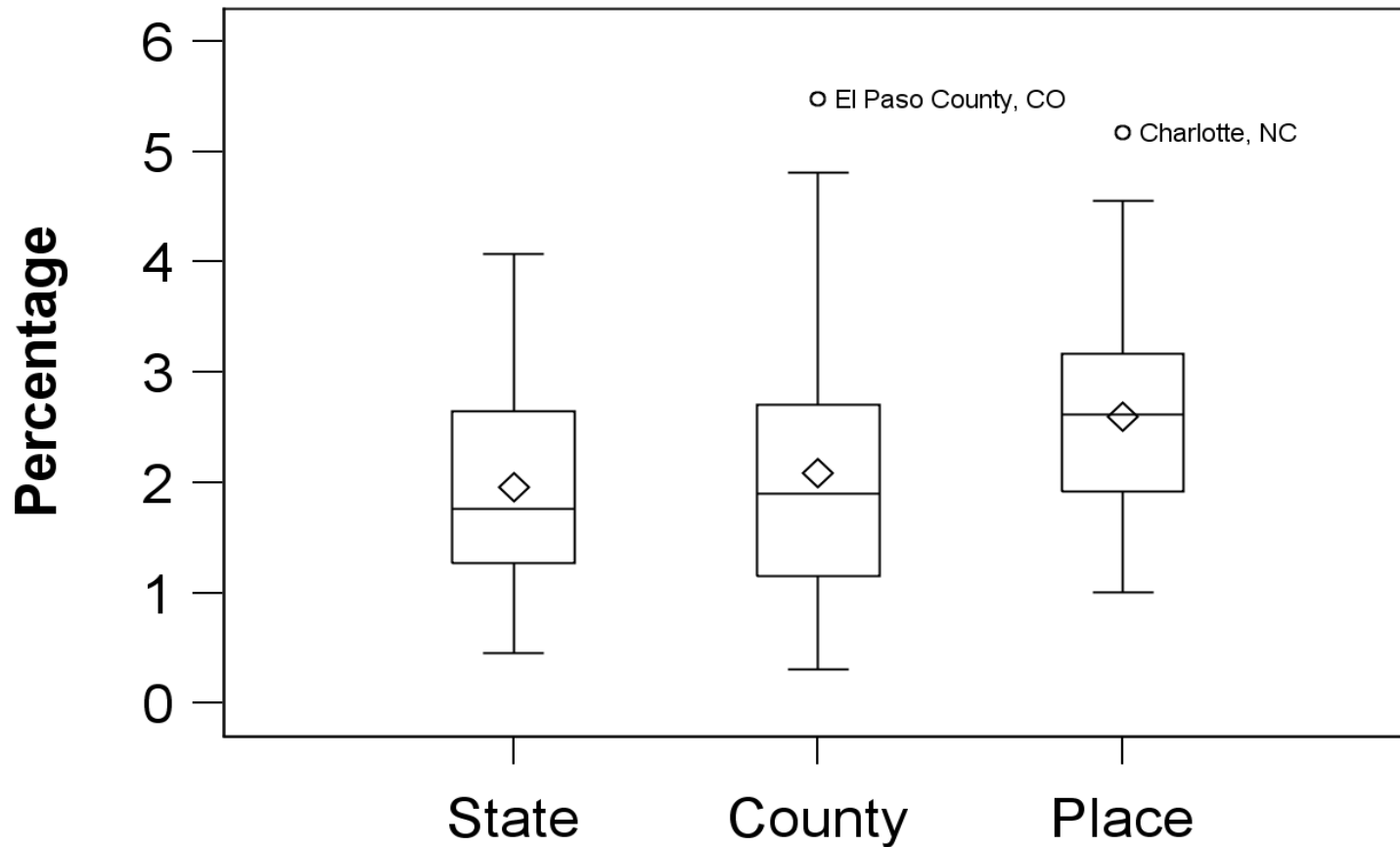
Person Correct Enumeration Percentages for States, Counties, and Places



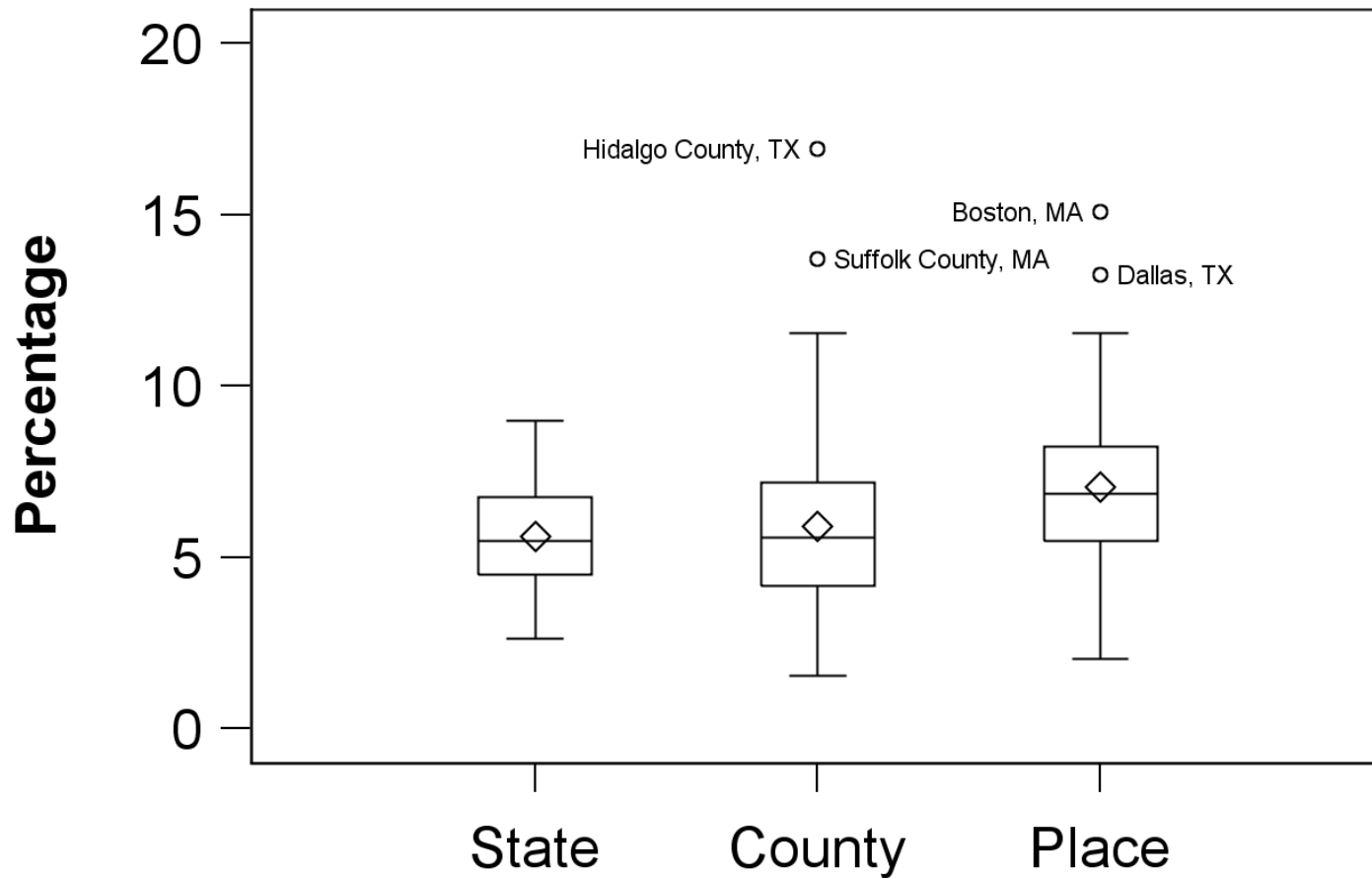
Person Erroneous Enumeration Percentages for States, Counties, and Places



Whole-Person Census Imputation Percentages for States, Counties, and Places

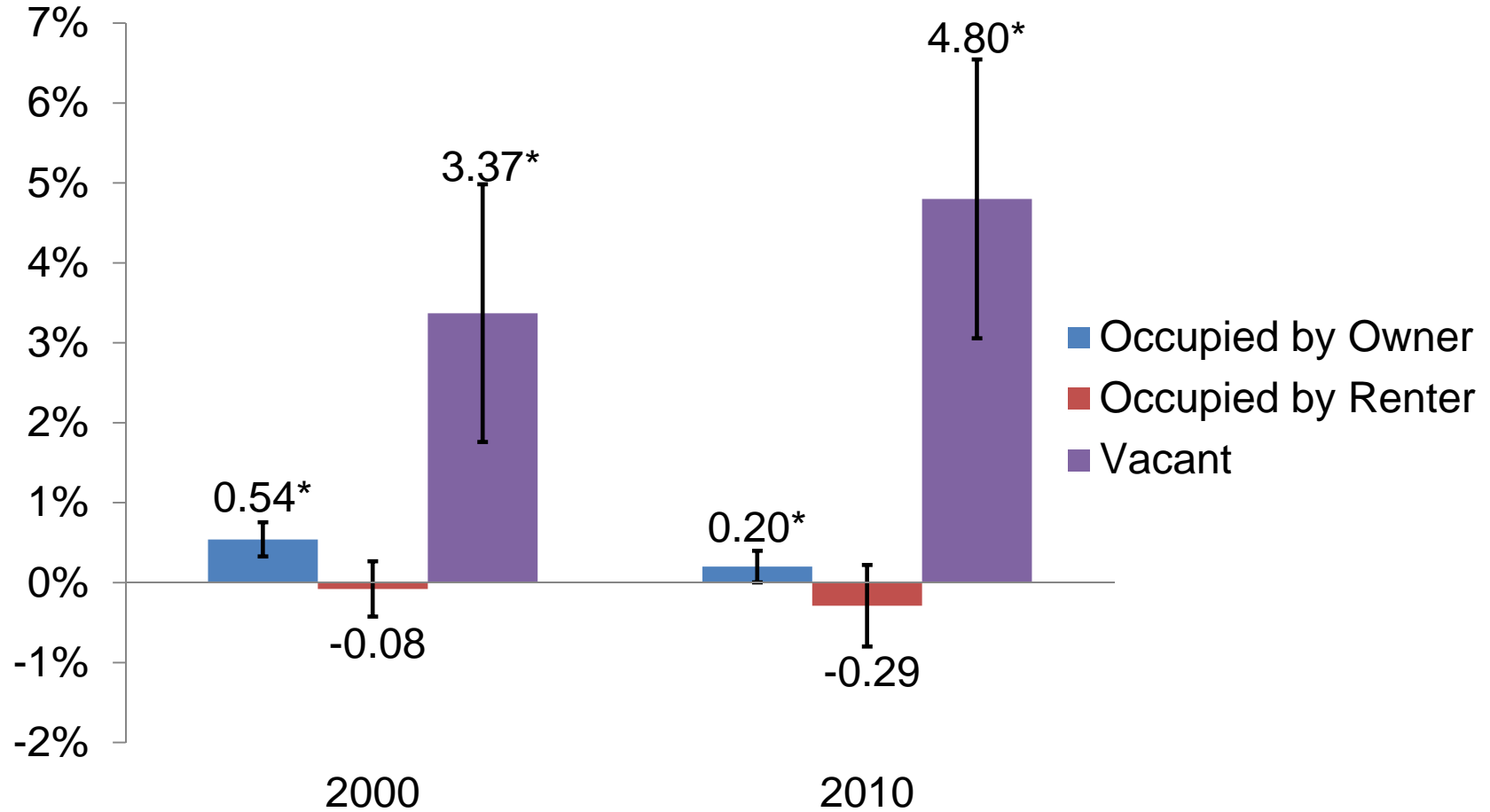


Person Omission Percentages for States, Counties, and Places



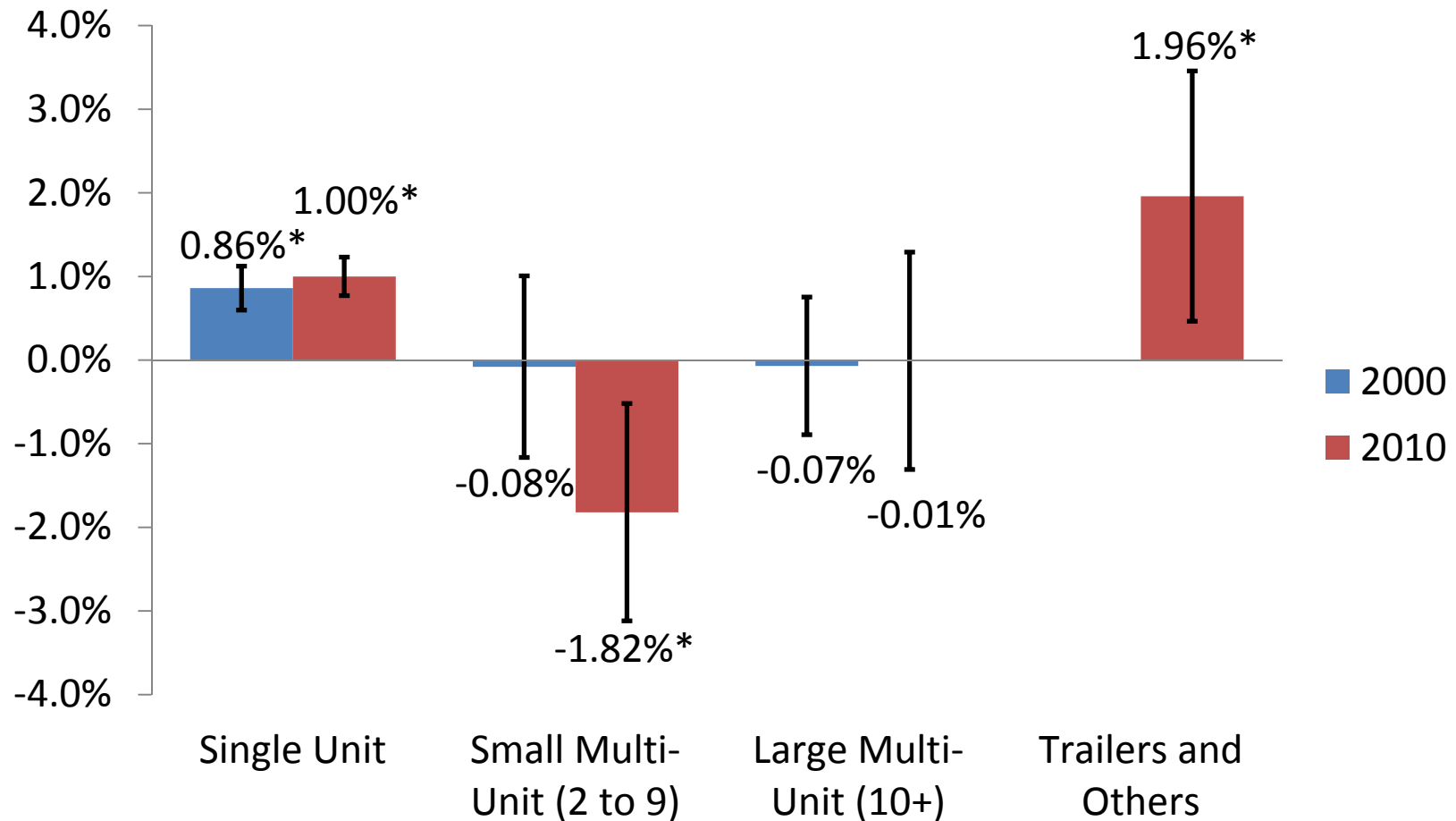
Results for Housing Units

Percentage Net Undercount for Housing Units by Tenure 2000 – 2010



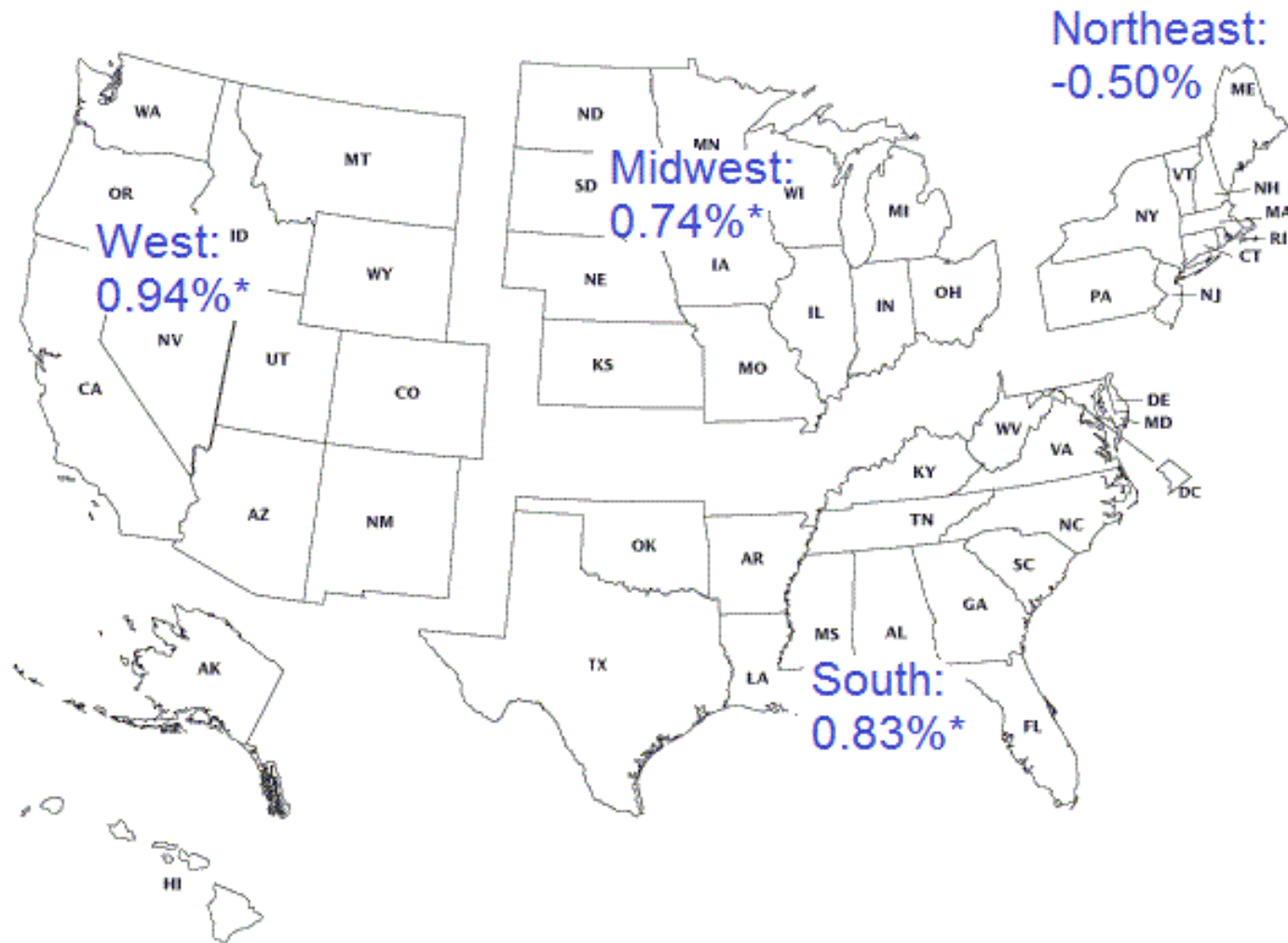
* Statistically significantly different from zero

Percent Undercount by Type of Structure for Housing Units 2000 - 2010



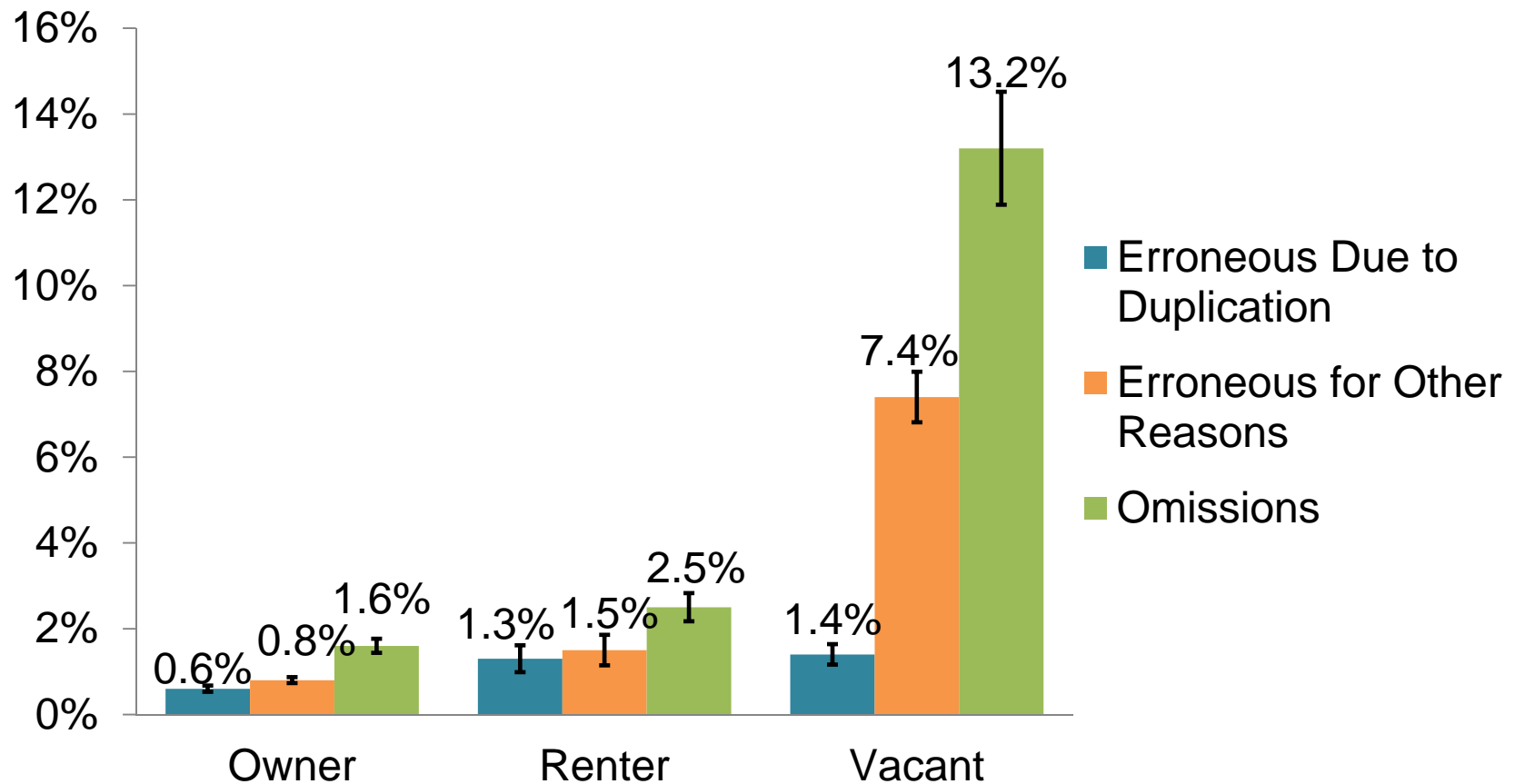
Note: The trailer category was not estimated in 2000

Percentage Undercount for Housing Units by Region in 2010



* Statistically significantly different from zero

Components of the Census Coverage in 2010 for Owners and Renters (Occupied Housing Units Only)



CCM Reports

Summary Reports

Summary of the Estimates of Coverage for
Persons in the United States

Summary of the Estimates of Coverage for
Housing Units

CCM Reports

Person Coverage

Net Coverage for the Household
Population in the United States

Components of Census Coverage for the
Household Population in the United States

CCM Reports

Housing Unit Coverage

Net Coverage for Housing Units in the United States

Components of Census Coverage for Housing Units in the United States