Census Data in the 21ˢᵗ Century: *Changes and Challenges*

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Healthy People. Environments. Economies. 1

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OVERVIEW

Data programs covered ...

- Pre-2010 Decennial Census
- 2010 Decennial Census
- American Community Survey

Dimensions covered ...

- Periods
- Geographies
- Data Elements
- Data Quality
- Access and Analysis Issues

1970 CENSUS OF POPULATION

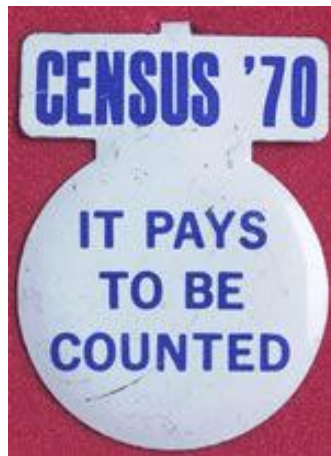**1980 Census of Population**

CENSUS '90

United States Census 2000

United States™ Census 2010

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U.S. CENSUS BUREAU

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CENSUS DATA IN THE 21ST CENTURY

PRE-2010 CENSUS

PRE-2010 CENSUS

Decennial Census is colloquially referred to as "Census data".

Two questionnaires and datasets ...

Short Form or SF-1 ...

- Constitutionally-mandated data collection.

- Includes all HHs.

- Basic demographic and housing information.
    - Age, sex, race, ethnicity.
    - HHs/size, families/size, relationships, housing units, occupancy/tenure, group quarters.

- Focus is to <u>count</u> the population for fair reapportionment.

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PRE-2010 CENSUS

Two questionnaires and datasets ...

Long Form or SF-3 ...

- Approximately 1-in-6 sample of HHs weighted to SF-1 population.

- Same data as SF-1, but includes socioeconomic data.
    - Migration, nativity, citizenship
    - Education and school enrollment
    - Employment by industry & occupation
    - Income, earnings & poverty
    - Housing unit characteristics and values/rents

- Focus is to <u>describe</u> the population and housing units

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PRE-2010 CENSUS

Periods …

- Once every 10 years.

Geographies …

- States, counties, cities/places, tracts, block-groups, blocks.
- Change every decade.

Data Quality …

- Excellent. Some errors, but too low for reporting.

Access and Analysis Issues …

- Prior to 2000 on CDs or tape. Prior to 1990 on tape or books. Access through Federal Library Depositories.
- Time-series analysis problematic.
- Changes in data elements, classifications, & geographies.

PRE-2010 CENSUS

However, this all changed in the 2000s ...

Existing Census had several issues ...

- Falling response rates to Long Form ... concern of Bureau.
- Rising costs ... concern of Congress.
- Outdated information ... concern of users.

In late 1990s, Congress and Census decided to drop the Long Form and replace it with the American Community Survey.
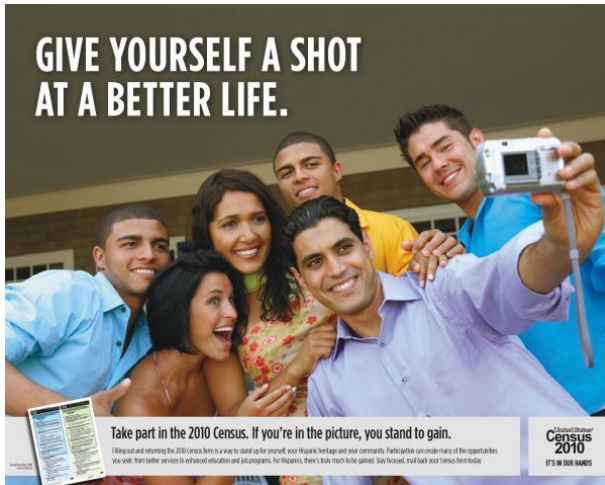
ACS tested between 2000-2002 and fully implemented in 2005.

This represented a radical shift not seen since the Long Form premiered in Census 1940.

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CENSUS 2010

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CENSUS 2010

Census 2010 changes …

Only includes the Short Form (the basics).
Census 2010 is only for reapportionment now.

Gone is the Long Form (the good stuff).
ACS collects socioeconomic data now.

Periods and Geographies …
- Once every 10 years. States down to blocks.

Data Quality …
- Excellent.

Access and Analysis Issues …
- Only basic demographic and housing data.
- Geographic comparison problems with Census 2k.

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Essential information ...

ACS replaces the Long Form or SF-3 data. Only 1 year lag.

ACS focus is on <u>describing</u> the population, not counting it.

ACS is a large, continuous, monthly national survey (290k HUs/mo).

ACS produces <u>annually updated</u> "period" estimates of 1, 3, & 5 years.

ACS geographic detail depends on "period".

ACS has more data quality issues due to "period-geography" mix.

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ACS versus Census 2k SF-3 … What's the same?

- Questionnaires are similar.

- Most reported data elements are similar.

- Geographies are similar.

- For the most part, ACS effectively replaces the old Long Form.

However, there are some critical differences …

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ACS versus Census 2k SF-3 … What's different?

- <u>Different methodologies</u> … ACS uses continuous sample of unknown and changing HUs vs. sample of known and fixed HUs.

- <u>Different time periods</u> … ACS data are pooled averages over time vs. point-in-time estimates.

- <u>Different sample sizes</u> … ACS may only sample 5-10% of HUs vs. the standard 17% SF-3 sample.

- <u>Difference residence rules</u> … ACS uses "2-month rule" in the sample month vs. residence on April 1.

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Periods ...

ACS provides <u>annual updates</u> for all geographies.
However, this is <u>not annual data</u>.

ACS data are <u>average characteristics</u> over a specific period of time.
Different from point-in-time estimates (eg annual or decennial data).

ACS provides data estimates for <u>1-year, 3-year, and 5-year periods</u>.
ACS data is collected every month, so ...

- 1-year data are pooled averages over <u>12 months</u>.
- 3-year data are pooled averages over <u>36 months</u>.
- 5-year data are pooled averages over <u>60 months</u>.

This is an important difference from previous Census!

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Periods – Overlapping Estimates ...

- It is <u>not annual change</u> between 2010 vs. 2011.
- Rather it is <u>average change</u> between <u>2008-2010</u> vs. <u>2009-2011</u>.
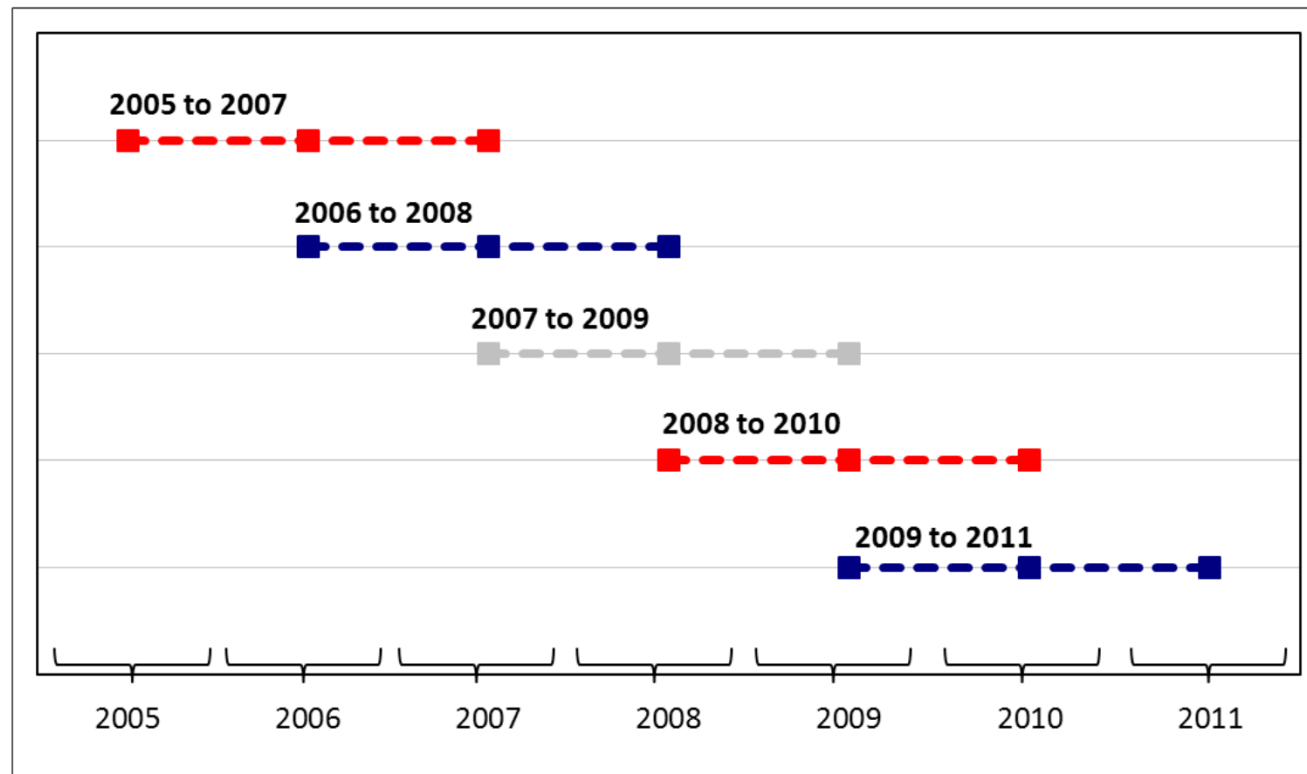
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Periods – Other Information ...

Period estimates are weighted to control for age, sex, race, ethnicity.
Weights based on Census 2010 or Population Estimates (a problem).

Period estimates refer to the range, not any one year or midpoint.
e.g.   2006-2010 MHHI, <u>not</u> 2006 MHHI or 2010 MHHI.
            Cited as 2006-2010 ACS.

Income data is adjusted to last year of the estimate.
e.g.   2006-2010 MHHI is in 2010 dollars.

Geographic boundaries are adjusted to last year of the estimate.

However, some period estimates are only available
at some geographies.

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Geographies …

ACS produces period estimates for different geographies based on population size … larger areas updated more often.

1-Year Estimates …
- Geographies with populations of 65,000+.
- All states (including DC & PR) and congressional districts.
- Includes 24.9% of counties and 2.1% of places.

3-Year Estimates …
- Geographies with populations of 20,000+ (plus 1-yr areas).
- Includes 58.6% of counties and 8.3% of places.

5-Year Estimates …
- Geographies with populations under 20,000
- Includes all geographies.

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Geographies – Urban v. Rural Divide …

Larger urban areas are advantaged …

* Most have 1-yr estimates (essentially "annual" data).
* Allows for better tracking of changes.
* Easier comparisons to previous Censuses.
* Main goal of ACS.

Smaller rural areas are disadvantaged …

* Most only have 5-year estimates.
* Change harder to track over many years (think Great Recession).
* Almost impossible to compare to previous Censuses.
* Rural planners and rural social scientists have lost info.

Implications for many Iowa communities.

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Most Iowa communities will only get 5-year estimates.

Only large cities will get yearly estimates.

Metropolitan Area

ACS Data Updates

- 1-Year Estimates
- 3-Year Estimates
- 5-Year Estimates

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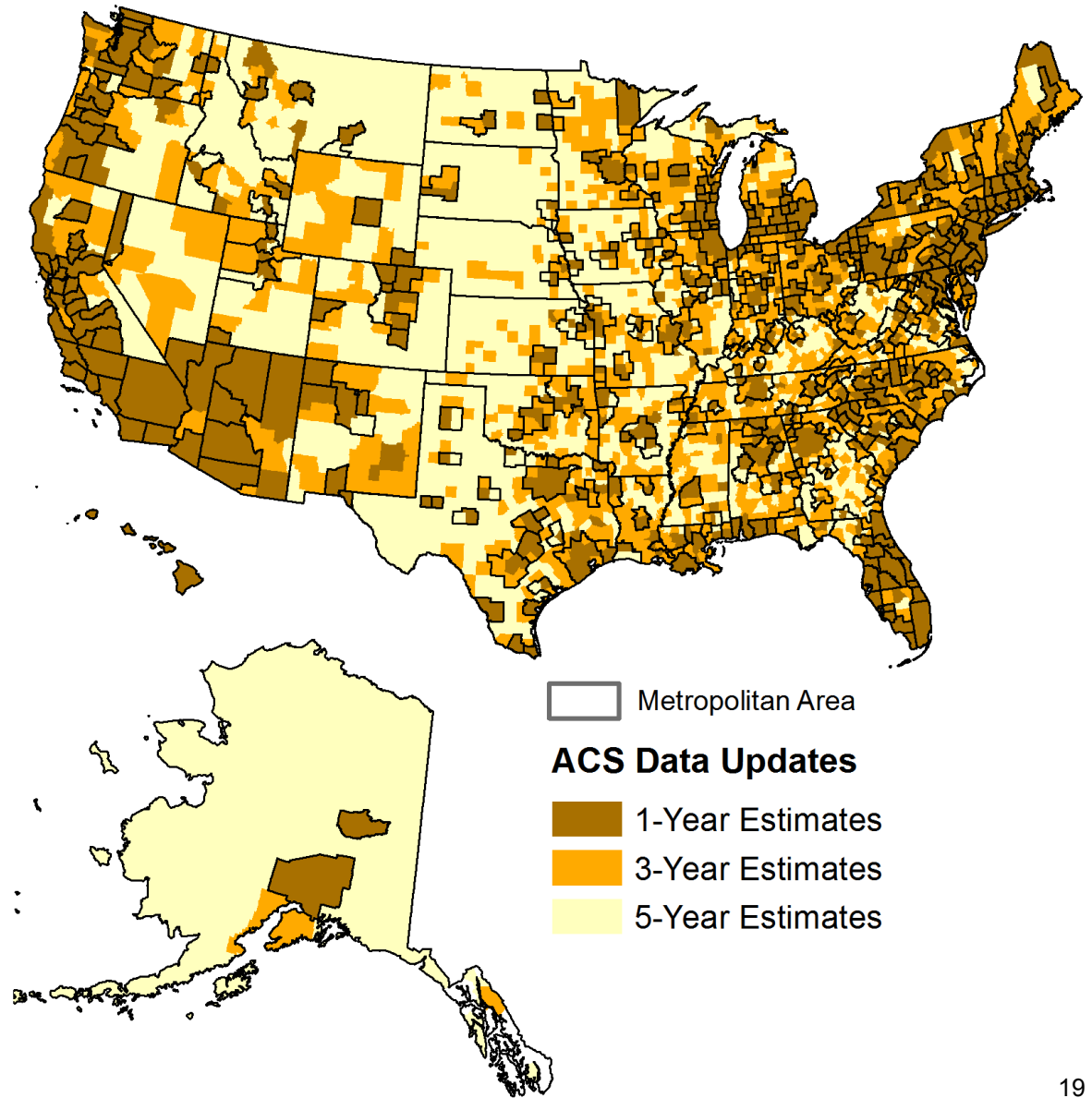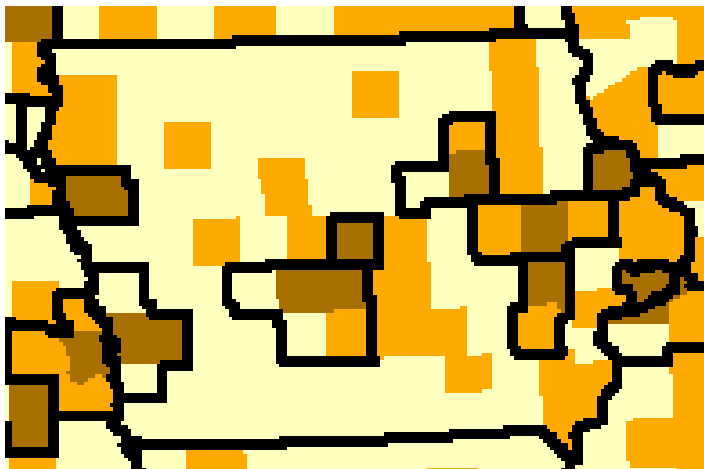
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On average, data are estimated with a 10-15% sample of the population.

Larger samples in small places, smaller ones in large places.

Metropolitan Area

Population Coverage Rate 2006-2010 ACS

- 6.0% or less
- 6.1 to 10.0%
- 10.1 to 15.0%
- 15.1 to 20.0%
- 20.1% or more

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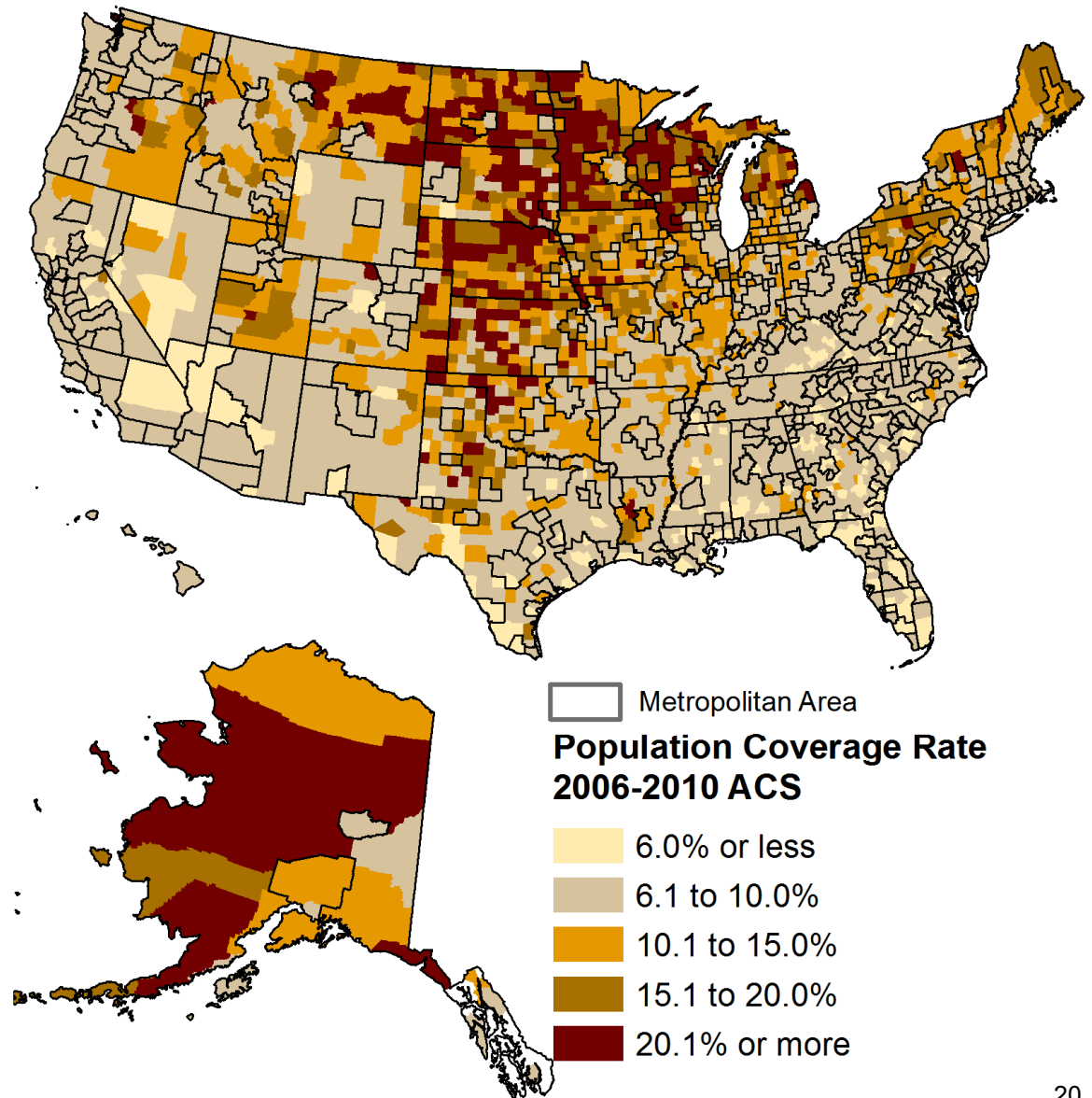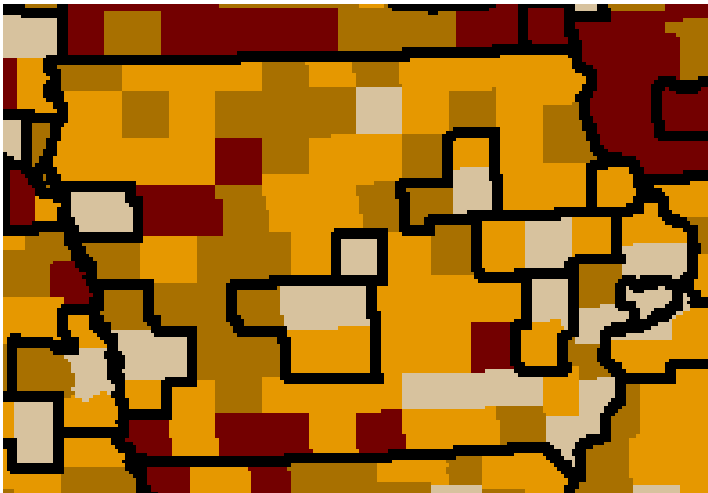
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All places in Iowa lost coverage relative to Long Form.

Minimal change in the populated coasts, large loss in the Midwest and Plains.

**Change in Population Coverage
2006-2010 ACS vs. 2000 Census**

Metropolitan Area

- -20.1% or more loss
- -15.1 to -20.0% loss
- -10.1 to -15.0% loss
- -0.1 to -10.0% loss
- Gain

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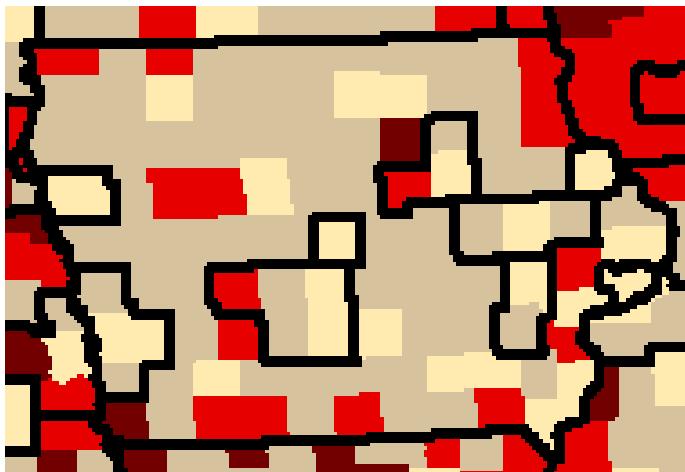
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Geographies – Changing Boundaries …

Boundaries fixed on January 1 of last "period" year.

However …
- Frequent change due to annexations, mergers, and other changes.
- Tracked by Census Boundary & Annexation Survey (BAS).

Stable boundaries include …
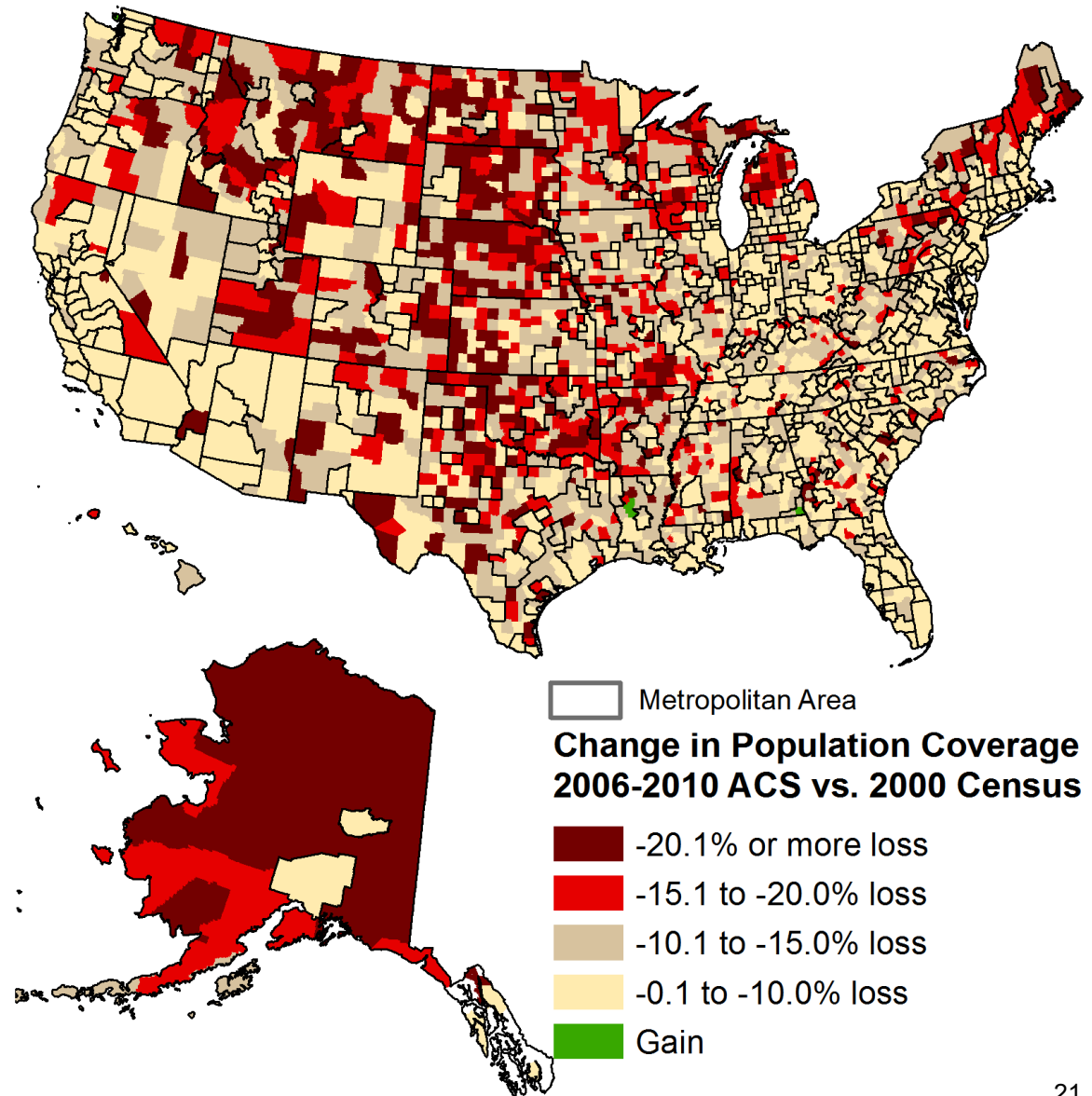- States, counties, congressional districts.

Variable boundaries include …
- Places, school districts, ZIPs, tracts.

To make valid comparisons over time boundaries need to be stable. If not, GIS technologies are needed to "normalize" the boundaries.

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Geographies – Basic Definitions …

Counties – Legally defined counties, parishes, independent cities.
- Metros – core urban area of 50,000+ including commuter counties.
- Micros – core urban area of 10,000 – 49,999.
- Non-Core – all others, often termed "non-metro".

ZIP Codes – called ZCTAs, similar to USPS codes. Available 2007-11.

Places/CDP – cities, towns, villages (incorporated or not).

School Districts – includes elementary, secondary, unified.

Census Tracts – statistical subdivision of county. Best sub-county unit.

Block-Groups – statistical subdivision of tracts. For custom areas.

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Data Elements – Population …

SOCIAL	ECONOMIC
Ancestry	Employment & Work Status
Citizenship & Year of Entry	Income & Earnings
Disability Status	Industry & Occupation
Educational Attainment	Class of Worker
Field of Degree	Commuting
Health Insurance	Poverty Status
Grandparents	SNAP Receipt
Fertility	
Language	**DEMOGRAPHIC**
Marital Status & History	Age & Sex
Place of Birth	Race & Hispanic Origin
Migration	
Relationship	
School Enrollment	
Veteran Status	

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Data Elements – Housing …

Age of Householder
House Heating Fuel
Household Size
Kitchen Facilities
Occupancy and Vacancy
Owner Statistics
Plumbing Facilities
Race of Householder
Renter Statistics
Rooms and Bedrooms
Telephone Service
Tenure

Units in Structure
Value of Home
Vehicles Available
Year Householder Moved Into Unit
Year Structure Built

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Data Elements – ACS Products …

For novice users …

- Data Profiles – fact sheets for a selected geography. Good for quick facts.

- Narrative Profiles – text description of info in Data Profile. Provides more context to the data.

- Comparison Profiles – side-by-side data of 5 most recent ACS estimates. Good for comparisons across time.

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Data Elements – ACS Products …

For experienced users …

- <u>Subject Tables</u> – provide more detailed info than available in Data Profiles. Only includes about 60 key "subject" topics.

- <u>Geographic Comparison Tables</u> – side-by-side data of Subject Tables for 2 or more geographies. Useful tool.

For research users …

- <u>Detailed and Summary Tables</u> – detailed data for all topics and all geographies. Accessible by FTP in CSV files.

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Data Elements – How to Access …

American FactFinder – http://factfinder2.census.gov

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Data Quality …

ACS is a large, continuous, monthly national survey.
Estimates socioeconomic info for small population areas over time.
Because of this, ACS data are more prone to <u>error</u>.

Sources of error …

- <u>Coverage Error</u> – error from missing certain segments of the population (eg homeless, illegals, migrants).

- <u>Non-Response Error</u> – error from skipped questions or unreturned surveys (eg minorities, poor, young).

- <u>Measurement Error</u> – incorrect answers (eg income, public assistance).

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Data Quality …

Sources of error …

- <u>Reliability Errors</u> – inconsistency of responses across data collection months (eg time effects, like the Great Recession and unemployment).

Assessing error in ACS …

- ACS does <u>not</u> flag poor quality estimates.
- ACS only provides MOEs and lets the <u>user decide</u>.

- The problem is that most users are unfamiliar with the statistical concepts needed assess data quality.

- Major issue in ACS!

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Data Quality – An Example …

Child Poverty Rate in Cyclone City, IA …

ACS	Est	MOE	SE	CV
3-yr	18.2	+/-4.8		
5-yr	18.2	+/-9.6		

ACS provides MOE, but this tells you little about data quality.

3-yr 90% CI = 13.4 – 18.2 – 23.0
5-yr 90% CI =   8.6 – 18.2 – 27.8   ---->*more error, but should we care?*

Margin of Error … 90% confidence interval around the estimate. Represents difference between sample and population. Difficult to understand by itself. ACS provides.

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Data Quality – An Example …

Child Poverty Rate in Cyclone City, IA …

ACS	Est	MOE	SE	CV
3-yr	18.2	+/-4.8	2.918	0.160
5-yr	18.2	+/-9.6	5.836	0.321

Rules of Thumb … Good<25%, Caution=25-50%, Poor>50%.

3-yr rate (CV=16.0%) is Good. 5-yr rate (CV=32.1%) is Cautious.

Standard Error … std deviation of sample vs. population estimate. Not intuitive by itself, but intermediate calculation. ACS does not provide.

Coefficient of Variation … error/unreliability of estimate expressed as a percentage. Lower pcts indicate better data quality. Intuitive & easy measure. ACS does not provide.

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Data Quality …

Understanding MOEs is the greatest challenge for ACS users.

- ACS does not flag poor quality estimates.
- Users need to calculate and interpret CVs to assess quality.

Data quality a major issue for …

- Smaller population areas, especially rural.
- Specific sub-populations (eg race by age by poverty).
- Areas undergoing major change (eg economic boom or bust).

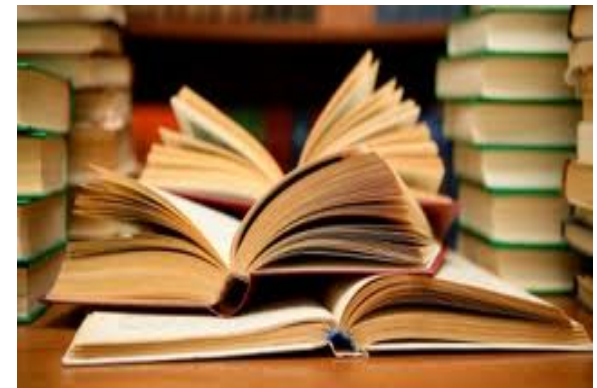Many users <u>unaware</u> of data quality issues.
Potential to make <u>poor decisions</u> based on poor data.

Requires major outreach effort in Iowa.

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SUMMARY OF
ACCESS AND ANALYSIS ISSUES

ISSUES

Census Program Issues …

- Census 2010 is for <u>counting</u> the population.
- ACS is for <u>describing</u> the population.
- Long-Form / SF-3 no longer collected.

Time Issues …

- ACS are <u>annual updates of period estimates</u>, not annual data.
- Period estimates depend on area population size.
- Census 2k comparisons over time problematic.

Geographic Issues …

- Geographies change often, especially after Decennial Census.
- GIS corrections needed to make valid spatial comparisons.
- Census 2k comparisons over sub-county areas problematic.

ISSUES

Data Quality Issues ...

- ACS has <u>more error</u> in the data than Census 2k.
- <u>Users</u> are responsible for assessing data quality.
- However, most users do not know how ... major need in Iowa.

Access Issues ...

- AFF is now the main method of delivering Census data.
- Problems with interface, support, and archiving.

Support Issues ...

- Understaffing at state FDLP libraries and Census data centers.
- Census Bureau centralizing dissemination and support.
- Private vendors have stepped in to fill the gap (eg GeoLytics, SocialExplorer).

NEXT STEPS

Census/ACS Outreach ...

Understanding Census Data ...
- Basic overview of Census and ACS programs.

Accessing and Assessing Census Data ...
- Hand-on experience using AFF and computing CVs.

Advanced Census Data Analysis ...
- Hands-on experience using raw data, GIS corrections, & PUMS.

Statewide effort coordinated by ISU Extension.
Target audience are local government, NGOs, and students.

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THANK YOU

Comments and Questions

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