

# Census Data in the 21<sup>st</sup> Century: *Changes and Challenges*



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IOWA STATE UNIVERSITY  
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Healthy People. Environments. Economies. <sup>1</sup>

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# OVERVIEW

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## 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  
2010

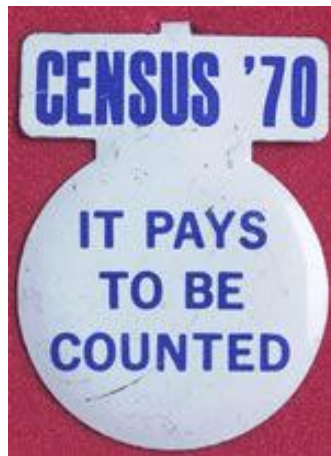
United States  
Census  
2000

AMERICAN  
COMMUNITY  
SURVEY  
U.S. CENSUS BUREAU

# ***CENSUS DATA IN THE 21<sup>ST</sup> CENTURY***

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## **PRE-2010 CENSUS**



# ***PRE-2010 CENSUS***

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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 count the population for fair reapportionment.

# ***PRE-2010 CENSUS***

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## **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 describe the population and housing units

# ***PRE-2010 CENSUS***

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## **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***

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**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.

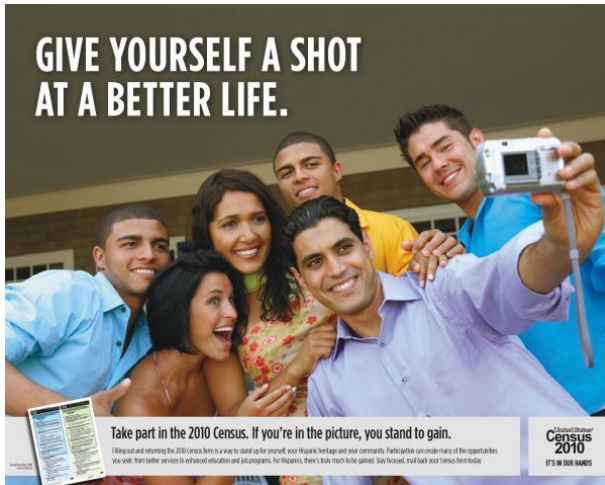
ACS tested between 2000-2002 and fully implemented in 2005.

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



# CENSUS DATA IN THE 21<sup>ST</sup> CENTURY

## CENSUS 2010



United States Census 2010

This is the official form for all the people at this address. It is quick and easy, and your answers are protected by law.

U.S. DEPARTMENT OF COMMERCE  
Economics and Statistics Administration  
U.S. CENSUS BUREAU

Use a blue or black pen.  
**Start here**

The Census must count every person living in the United States on April 1, 2010.  
Before you answer Question 1, count the people living in this house, apartment, or mobile home using our guidelines.

- Count all people, including babies, who live and sleep here most of the time.
- The Census Bureau also conducts counts in institutions and other places, so:
- Do not count anyone living away either at college or in the Armed Forces.
- Do not count anyone in a nursing home, jail, prison, detention facility, etc. on April 1, 2010.
- Leave these people off your form, even if they will return to live here after they leave college, the nursing home, the military, jail, etc. Otherwise, they may be counted twice.

The Census must also include people without a permanent place to stay, so:

- If someone who has no permanent place to stay is staying here on April 1, 2010, count that person. Otherwise, he or she may be missed in the census.

1. How many people were living or staying in this house, apartment, or mobile home on April 1, 2010?  
Number of people =

2. Were there any additional people staying here April 1, 2010 that you did not include in Question 1? Mark ☐ Yes, all that apply.

- ☐ Children, such as newborn babies or foster children
- ☐ Relatives, such as adult children, cousins, or in-laws
- ☐ Nonrelatives, such as roommates or live-in baby sitters
- ☐ People staying here temporarily
- ☐ No additional people

3. Is this house, apartment, or mobile home—  
Mark ☐ ONE box.

- ☐ Owned by you or someone in this household with a mortgage or loan? Include home equity loans.
- ☐ Owned by you or someone in this household free and clear (without a mortgage or loan)?
- ☐ Rented?
- ☐ Occupied without payment of rent?

4. What is your telephone number? We may call if we don't understand an answer.  
Area Code + Number

5. Please provide information for each person living here. Start with a person living here who owns or rents this house, apartment, or mobile home. If the owner or renter lives somewhere else, start with any adult living here. This will be Person 1.  
What is Person 1's name? Print name below:

Last Name   
First Name  MI

6. What is Person 1's sex? Mark ☐ ONE box.  
☐ Male ☐ Female

7. What is Person 1's age and what is Person 1's date of birth? Please report below as age 0 when the child is less than 1 year old. Print numbers in boxes.

Age on April 1, 2010            
Month Day Year of birth

NOTE: Please answer BOTH Question 8 about Hispanic origin and Question 9 about race. For this census, Hispanic origins are not races.

8. Is Person 1 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, Argentine, Colombian, Dominican, Hungarian, Salvadoran, Spanish, and so on.

9. What is Person 1's race? Mark ☐ ONE or more boxes.

- ☐ White
- ☐ Black, African Am., or Negro
- ☐ American Indian or Alaska Native — Print name of ancestor or people's tribe
- ☐ Asian Indian
- ☐ Japanese
- ☐ Native Hawaiian
- ☐ Chinese
- ☐ Korean
- ☐ Guamanian or Chamorro
- ☐ Filipino
- ☐ Vietnamese
- ☐ Samoan
- ☐ Other Asian — Print race, for example, Hmong, Laotian, Thai, Russian, Cambodian, and so on.
- ☐ Other Pacific Islander — Print race, for example, Fijian, Tongan, and so on.
- ☐ Some other race — Print race

10. Does Person 1 sometimes live or stay somewhere else?  
☐ No ☐ Yes — Mark ☐ all that apply.

- ☐ In college housing
- ☐ In the military
- ☐ At a seasonal or second residence
- ☐ For child custody
- ☐ In jail or prison
- ☐ In a nursing home or second residence
- ☐ For another reason

→ If more people were counted in Question 1, continue with Person 2.

OMB No. 0507-0049-C Approval Expires 12/31/2011  
Form D-61 (2-2010)

U.S. CENSUS BUREAU





# ***CENSUS 2010***

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## **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.



# ***CENSUS DATA IN THE 21<sup>ST</sup> CENTURY***

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## **AMERICAN COMMUNITY SURVEY**



# ***AMERICAN COMMUNITY SURVEY***

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## **Essential information ...**

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

ACS focus is on describing the population, not counting it.

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

ACS produces annually updated “period” estimates of 1, 3, & 5 years.

ACS geographic detail depends on “period”.

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

# ***AMERICAN COMMUNITY SURVEY***

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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?**

- Different methodologies ... ACS uses continuous sample of unknown and changing HUs vs. sample of known and fixed HUs.
- Different time periods ... ACS data are pooled averages over time vs. point-in-time estimates.
- Different sample sizes ... ACS may only sample 5-10% of HUs vs. the standard 17% SF-3 sample.
- Difference residence rules ... ACS uses "2-month rule" in the sample month vs. residence on April 1.

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## **Periods ...**

ACS provides annual updates for all geographies.  
However, this is not annual data.

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

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

- 1-year data are pooled averages over 12 months.
- 3-year data are pooled averages over 36 months.
- 5-year data are pooled averages over 60 months.

***This is an important difference from previous Census!***

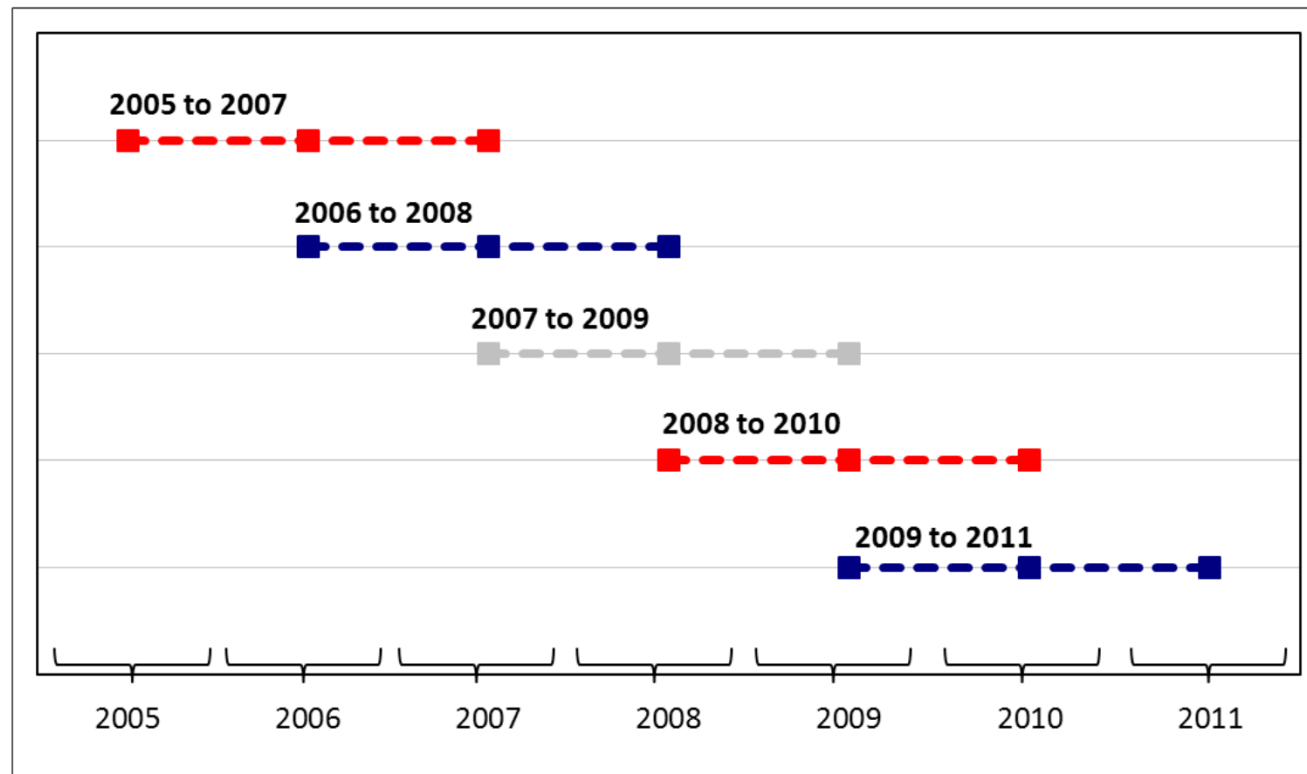


# AMERICAN COMMUNITY SURVEY

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## Periods – Overlapping Estimates ...

- It is not annual change between 2010 vs. 2011.
- Rather it is average change between 2008-2010 vs. 2009-2011.



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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, not 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.***

# ***AMERICAN COMMUNITY SURVEY***

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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 ...

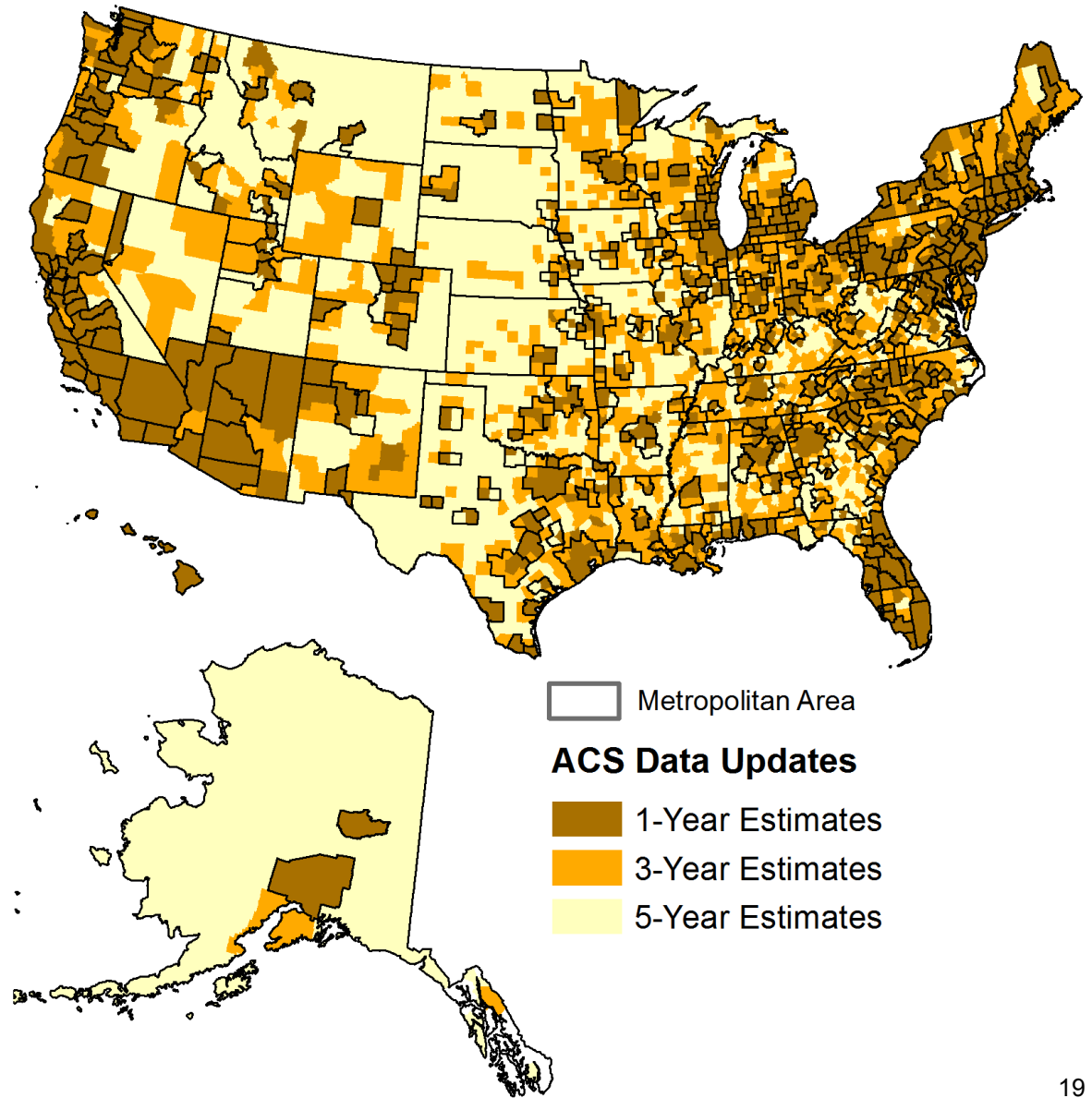
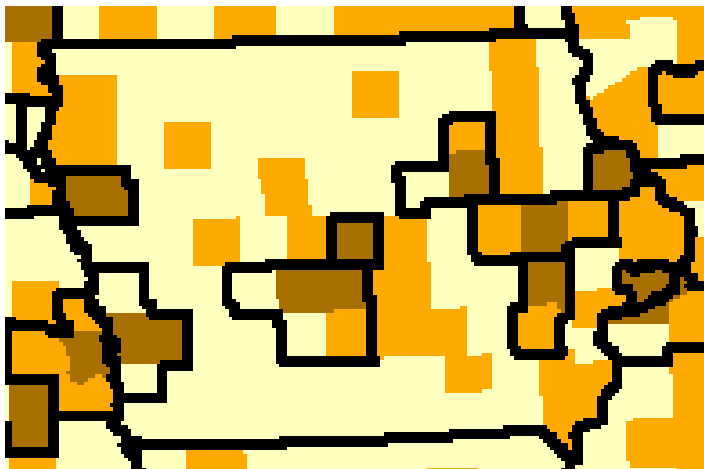
- Most only have 5-year estimates.
- Change harder to track over many years (think Great Recession).
- Almost impossible to compare to previous Censuses.
- Rural planners and rural social scientists have lost info.

**Implications for many Iowa communities.**

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Most Iowa communities will only get 5-year estimates.

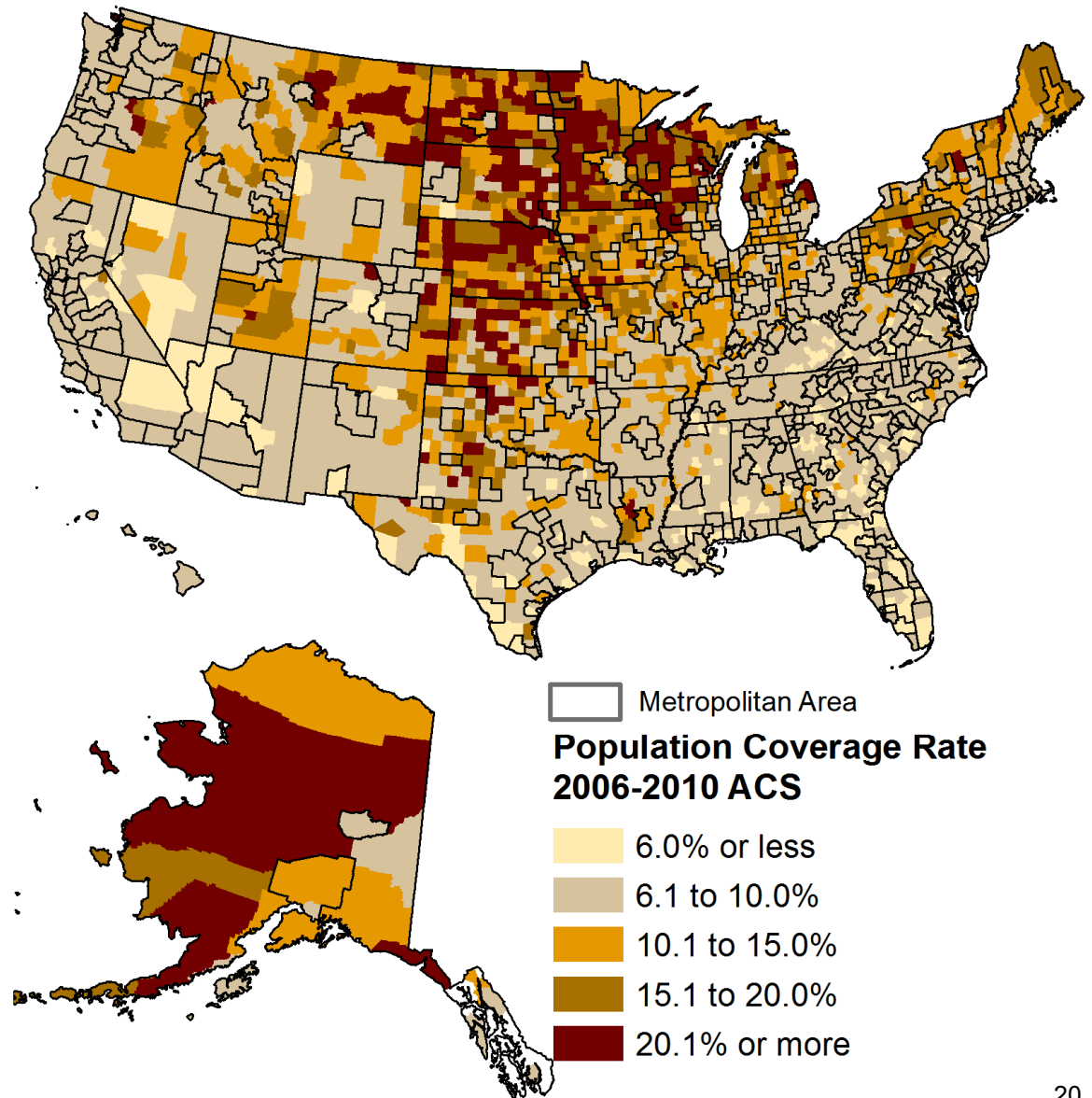
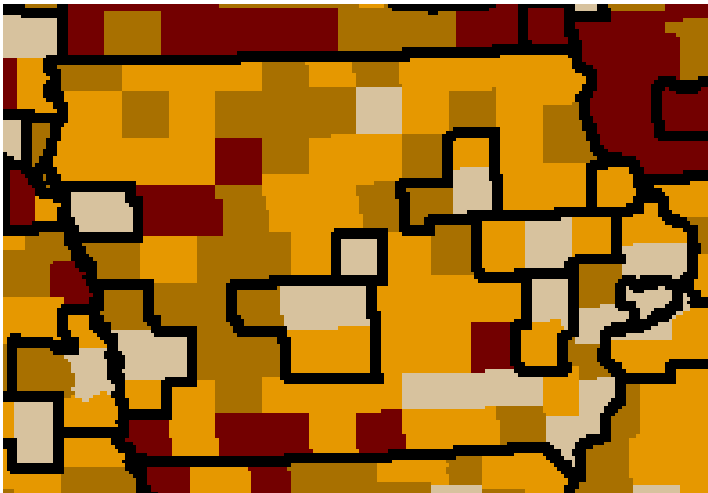
Only large cities will get yearly estimates.



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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.

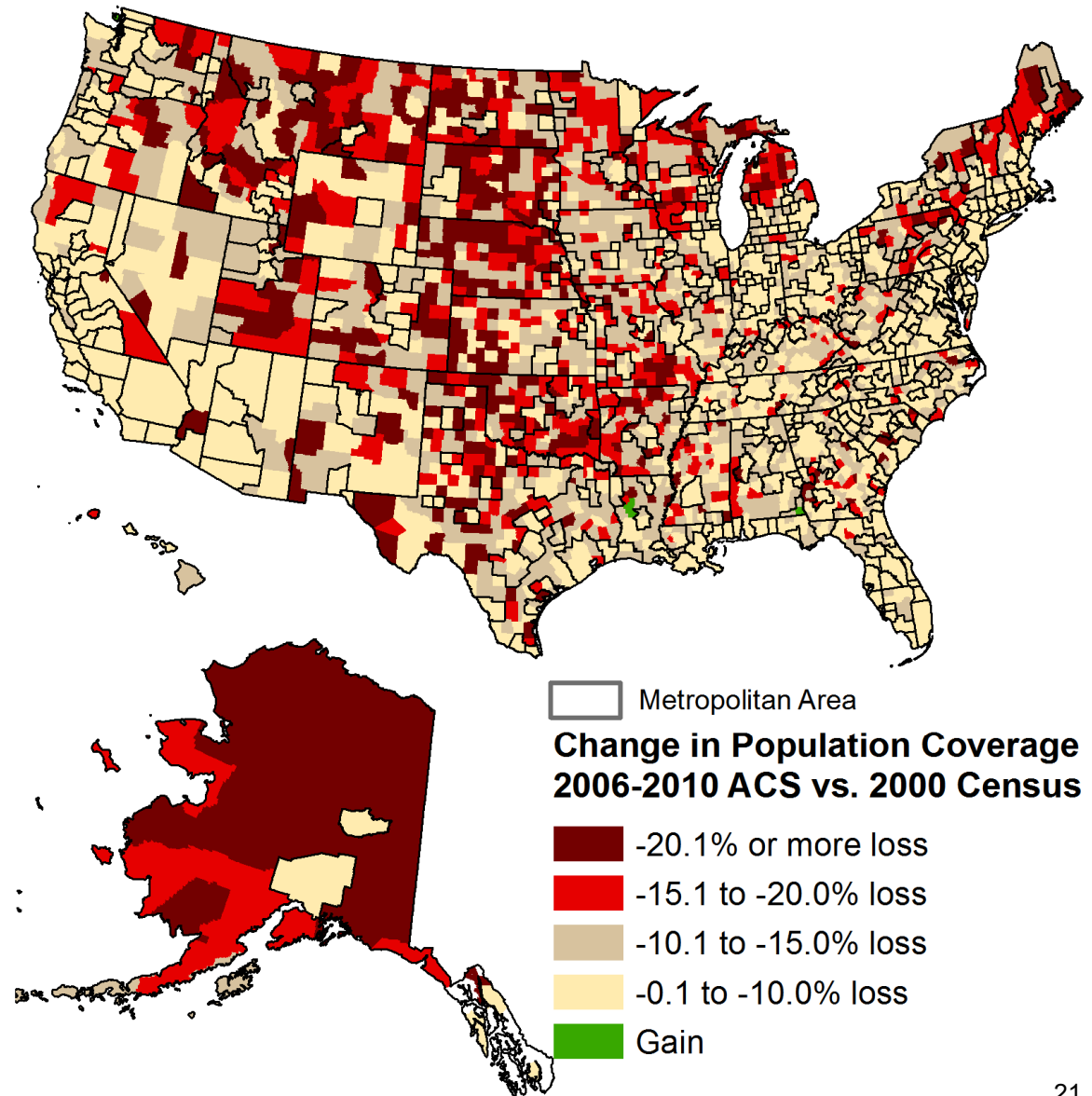
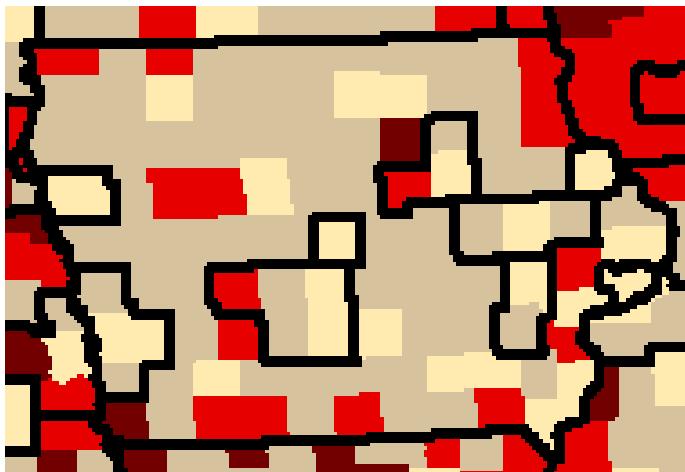




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All places in Iowa lost coverage relative to Long Form.

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



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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.

# ***AMERICAN COMMUNITY SURVEY***

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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.

# ***AMERICAN COMMUNITY SURVEY***

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## **Data Elements – Population ...**

### **SOCIAL**

Ancestry  
Citizenship & Year of Entry  
Disability Status  
Educational Attainment  
Field of Degree  
Health Insurance  
Grandparents  
Fertility  
Language  
Marital Status & History  
Place of Birth  
Migration  
Relationship  
School Enrollment  
Veteran Status

### **ECONOMIC**

Employment & Work Status  
Income & Earnings  
Industry & Occupation  
Class of Worker  
Commuting  
Poverty Status  
SNAP Receipt

### **DEMOGRAPHIC**

Age & Sex  
Race & Hispanic Origin

# ***AMERICAN COMMUNITY SURVEY***

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## **Data Elements – Housing ...**

Age of Householder	Units in Structure
House Heating Fuel	Value of Home
Household Size	Vehicles Available
Kitchen Facilities	Year Householder Moved Into Unit
Occupancy and Vacancy	Year Structure Built
Owner Statistics	
Plumbing Facilities	
Race of Householder	
Renter Statistics	
Rooms and Bedrooms	
Telephone Service	
Tenure	

# ***AMERICAN COMMUNITY SURVEY***

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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.



# ***AMERICAN COMMUNITY SURVEY***

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## **Data Elements – ACS Products ...**

### ***For experienced users ...***

- Subject Tables – provide more detailed info than available in Data Profiles. Only includes about 60 key “subject” topics.
- Geographic Comparison Tables – side-by-side data of Subject Tables for 2 or more geographies. Useful tool.

### ***For research users ...***

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

# AMERICAN COMMUNITY SURVEY

## Data Elements – How to Access ...

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

The screenshot displays the U.S. Census Bureau American FactFinder website. The header includes the U.S. Census Bureau logo and the American FactFinder logo. Navigation tabs include MAIN, SEARCH (highlighted), WHAT WE PROVIDE, and USING FACTFINDER. A search bar is present with a 'GO' button. Below the search bar, there are sections for 'Your Selections' (currently empty) and 'Search Results:'. A 'Search for:' input field is also visible. On the left side, there are filters for 'Topics', 'Geographies', 'Race and Ethnic Groups', and 'Industry Codes'. A 'Select Topics' dialog box is open, showing a list of topics to add to 'Your Selections'. The topics include People, Housing, Business and Industry, Year, Product Type, Program, and Dataset. The 'Program' section is expanded, showing a list of programs with their respective counts: American Community Survey (30,716), Annual Survey of Manufactures (91), Business Expenses Survey (4), Business Patterns (68), Commodity Flow Survey (106), Decennial Census (7,784), Economic Census (1,294), Nonemployer Statistics (26), Population Estimates (35), and Survey of Business Owners (197). The 'Dataset' section is also visible. A checkbox at the bottom of the dialog box allows users to 'Include archived products in your search'.

U.S. Census Bureau

AMERICAN FactFinder

MAIN SEARCH WHAT WE PROVIDE USING FACTFINDER Feedback FAQs Glossary Help

Search - Use the options on the left (topics, geographies, ...) to narrow your search results

Your Selections  
"Your Selections" is empty

Search Results:

Selected: View Download Compare Clear All ?

Search for: GO

Search using the options below:

Topics  
(age, income, year, dataset, ...)

Geographies  
(states, counties, places, ...)

Race and Ethnic Groups  
(race, ancestry, tribe)

Industry Codes  
(NAICS industry, ...)

Select Topics

Select Topics to add to "Your Selections" ?

- People
- Housing
- Business and Industry
- Year
- Product Type
- Program
  - American Community Survey (30,716)
  - Annual Survey of Manufactures (91)
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  - Population Estimates (35)
  - Survey of Business Owners (197)
- Dataset

☐ Include archived products in your search ?

# ***AMERICAN COMMUNITY SURVEY***

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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 error.

## **Sources of error ...**

- Coverage Error – error from missing certain segments of the population (eg homeless, illegals, migrants).
- Non-Response Error – error from skipped questions or unreturned surveys (eg minorities, poor, young).
- Measurement Error – incorrect answers (eg income, public assistance).

# ***AMERICAN COMMUNITY SURVEY***

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## **Data Quality ...**

### **Sources of error ...**

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

### **Assessing error in ACS ...**

- ACS does not flag poor quality estimates.
- ACS only provides MOEs and lets the user decide.
- The problem is that most users are unfamiliar with the statistical concepts needed assess data quality.
- Major issue in ACS!

# AMERICAN COMMUNITY SURVEY

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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.



# AMERICAN COMMUNITY SURVEY

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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 pct indicates better data quality. Intuitive & easy measure.

**ACS does not provide.**



# ***AMERICAN COMMUNITY SURVEY***

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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 unaware of data quality issues.

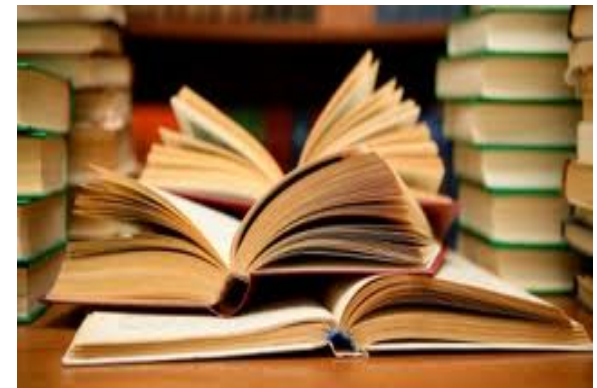
Potential to make poor decisions based on poor data.

**Requires major outreach effort in Iowa.**

# ***CENSUS DATA IN THE 21<sup>ST</sup> CENTURY***

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## **SUMMARY OF ACCESS AND ANALYSIS ISSUES**



# ***ISSUES***

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## **Census Program Issues ...**

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

## **Time Issues ...**

- ACS are annual updates of period estimates, 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***

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## **Data Quality Issues ...**

- ACS has more error in the data than Census 2k.
- Users 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***

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### **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.

**THANK YOU**

**Comments and Questions**

*For more information*

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