

Census Data in the 21st Century: *Implications for Local Government*



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OVERVIEW

Why data matters to local government ...

- Decision making depends on timely and accurate information.
- What are current conditions?
- What are trends, past and future?
- What is the impact?

Why Census data matters to local government ...

- Most complete socioeconomic picture of a community.
- Accurate, unbiased, and timely (only recently, though).
- Historical yet permanent (future data assured).
- Neighborhood-specific.

Private Sector "R&D" (rob & deploy) ...

- Repackaging by data vendors.
- Analysis by consultants (and academics!).



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OVERVIEW

Historic Census

- Pre-2010 Decennial Census

Current Census

- 2010 Decennial Census
- American Community Survey

Periods and Places ...

- Time and geography

Estimates and Errors

- Data elements and data quality

Measuring Local Development

- ACS for cities

1970
CENSUS OF
POPULATION

1980
Census of
Population

CENSUS '90



United States™
Census
2010

United States
Census
2000



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CENSUS DATA IN THE 21ST CENTURY

HISTORIC CENSUS

1970
CENSUS OF
POPULATION

1980
Census of
Population

CENSUS '90



United States
Census
2000



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PRE-2010 CENSUS

What did "Census data" mean in the past?

Decennial Census

Two questionnaires and two 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.

Planners use it to count the population.
Only basic demographic information.



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PRE-2010 CENSUS

Two questionnaires and two datasets ...

Long Form or SF-3 ...

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



Planners use it to describe the population.
All the interesting information.



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PRE-2010 CENSUS

Periods ...

- Once every 10 years.

Geographies ...

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

Data Quality ...

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

Access and Analysis Issues ...

- Census 2000 on American FactFinder <http://factfinder2.census.gov>
- Census 1990 on another site <http://www.census.gov/main/www/cen1990.html>
- Census 1980 can be access through a Federal Depository Library or private vendors.



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NO CONCENSUS ON THE CENSUS

Census changed radically 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 it was replaced by 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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CURRENT CENSUS

United States™
**Census
2010**



AMERICAN
COMMUNITY
SURVEY
U.S. CENSUS BUREAU



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CENSUS 2010

What does "Census data" mean today?

Decennial Census

American Community Survey

Decennial 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, Geographies, Data Quality, & Access ...

- Same as historical Census for SF-1
- Once every 10 years. States down to blocks.
- Excellent data quality. Best for counts.
- Easily accessible on AFF.



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AMERICAN COMMUNITY SURVEY

What does “Census data” mean today?

Decennial Census

American Community Survey

ACS Essentials ...

Replaces the Long Form or SF-3 data.

Focuses on describing the population, not counting it.

Continuous national survey (290k HUs/mo), not point-in-time.

Annually updated “period” estimates, not once every decade.

Complex data availability depends on “period-geography” mix.

Data quality issues due to “period-geography” mix.



11

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AMERICAN COMMUNITY SURVEY

ACS versus Census 2000 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 ...



12

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AMERICAN COMMUNITY SURVEY

ACS versus Census 2000 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.

Two-Month Rule

Must live at housing unit for more than two months to be considered a resident.



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CENSUS DATA IN THE 21ST CENTURY

PERIODS AND PLACES



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PERIODS AND PLACES

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 from Decennial Census.

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

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

This is an important difference from Decennial Census!



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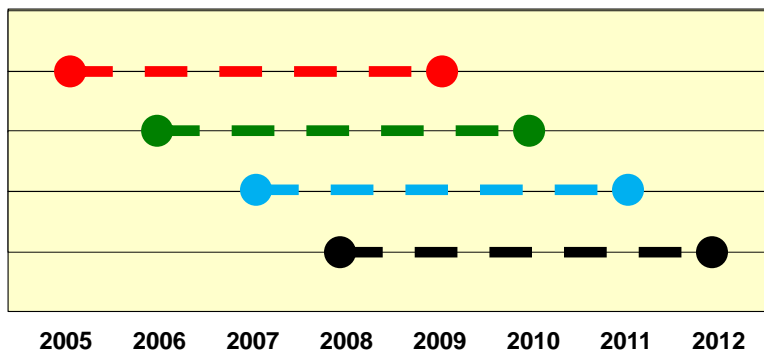
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PERIODS AND PLACES

Periods – Overlapping Estimates ...

- Average change between 2007-2011 vs. 2008-2012.
- It is not annual change between 2011 vs. 2012.



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PERIODS AND PLACES

Periods – Technical Details ...

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. 2008-2012 MHHI, not 2008 MHHI or 2012 MHHI.

Cited as 2008-2012 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.



PERIODS AND PLACES

***However, period estimates are only available
at certain geographic levels.***

Different periods, different geographies.

1-Year Estimates for large areas ...

- Geos with populations of 65,000+ (includes states and CDs).
- 24.9% of counties (**10.1% IA**) and 2.1% of places (**0.6% IA**).

3-Year Estimates for mid-sized areas ...

- Geos with populations of 20,000+ (plus 1-yr areas).
- 58.6% of counties (**36.4% IA**) and 8.3% of places (**2.2% IA**).

5-Year Estimates for small areas ...

- Geos with populations under 20,000 (plus 1-yr & 3-yr areas).
- Includes all geographies.



PERIODS AND PLACES

Geographies – Urban v. Rural Divide ...

Larger urban areas advantaged ...

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

Smaller rural areas 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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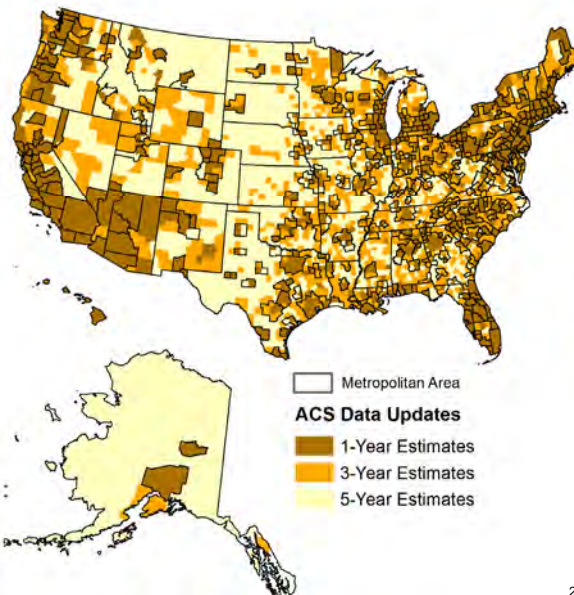
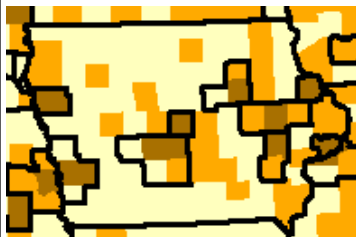
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PERIODS AND PLACES

Most Iowa communities will only get 5-year estimates.

Only large cities will get 1-year estimates.



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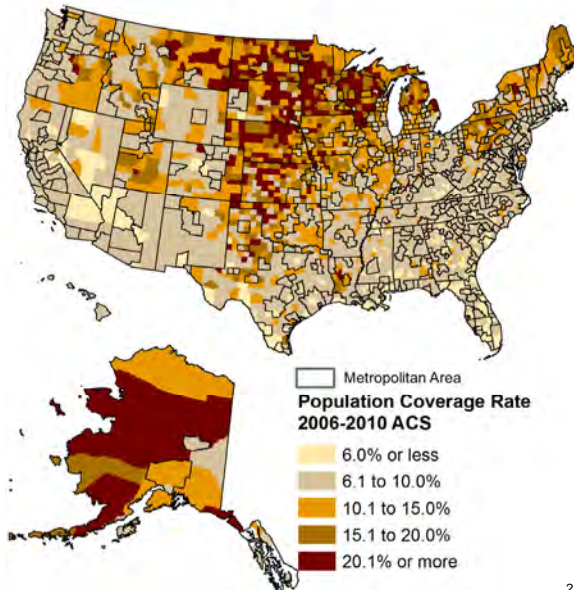
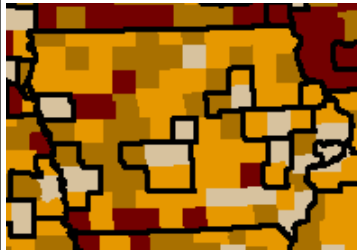
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PERIODS AND PLACES

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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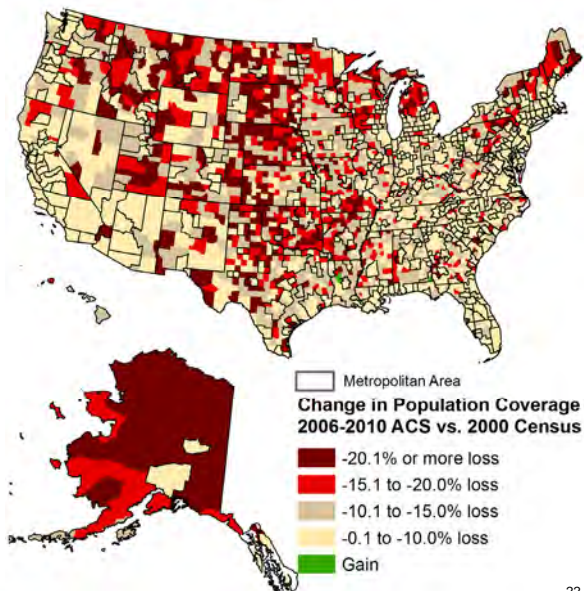
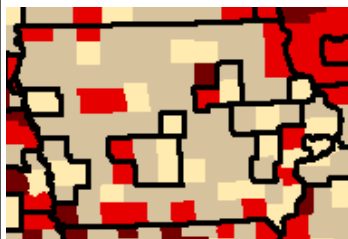
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PERIODS AND PLACES

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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PERIODS AND PLACES

Bouncing boundaries ...

Stable boundaries over time ...

- States and counties.

Change every 10 years ...

- Congressional districts, tracts, block-groups, & blocks.

Change every year (or subject to change) ...

- Places, school districts, ZIPs.
- Boundaries fixed on January 1 of last "period" year.
- Frequent change due to annexations, mergers, and other changes.
- Tracked by Census Boundary & Annexation Survey (BAS).

To make valid comparisons over time boundaries need to be stable.
GIS technologies are needed to "normalize" the boundaries.



PERIODS AND PLACES

Geographies – Technical Details ...

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.



CENSUS DATA IN THE 21ST CENTURY

ESTIMATES AND ERRORS



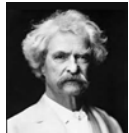
"Trust, but verify."

~President Ronald Reagan, quoting Russian proverb.



"There are three kinds of lies: lies, damned lies, and statistics."

~Prime Minister Benjamin Disraeli



"Facts are stubborn, but statistics are more pliable."

~Mark Twain

ESTIMATES AND ERRORS

Data Estimates – 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

ESTIMATES AND ERRORS

Data Estimates – 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	



27

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ESTIMATES AND ERRORS

Data Estimates – 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.



28

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ESTIMATES AND ERRORS

Data Estimates – 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.



ESTIMATES AND ERRORS

Error and ACS ...

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

What is statistical error?

We use estimates (sample) to measure reality (population). Error measures of how wrong our sample is from reality.

Assessing error in ACS ...

- ACS does not flag poor quality estimates.
- ACS only provides margins of error and lets the user decide.
- **Major issue in ACS!**



ESTIMATES AND ERRORS

Sources of error in ACS ...

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



ESTIMATES AND ERRORS

Data Quality ...

Understanding MOEs is the greatest challenge for ACS users.

- Users need to calculate and interpret MOEs/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.



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MEASURING LOCAL DEVELOPMENT: *EXAMPLE USING ACS*



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EXAMPLE USING ACS

How do I find ACS data for my city?

Ballpark your city's population ...

- If 65k or more, use 1-Year ACS
- If 20k-65k, use 3-Year ACS
- If under 20K, must use 5-Year ACS

EXAMPLE - What ACS estimate should you use ...

- Des Moines in Polk County?
- Mason City in Cerro Gordo County?
- Clarion in Wright County?
- Cambridge in Story County?

Go to [American FactFinder](#) to obtain data.



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EXAMPLE USING ACS

How good is ACS data for my city?

ACS provides a margin of error.
Larger MOE means poorer data.

MOEs by themselves not informative.
Confidence intervals better.

EXAMPLE – MOEs and CIs ...

Poverty = 18.2 MOE = ± 4.8

- Subtract MOE from the estimate to get the lower bound.
- Add MOE to get the upper bound.

CI = 13.4 \leftarrow 18.2 \rightarrow 23.0

In other words, we are 90% sure that the true poverty rate is between 13-23%, with 18% being the best (mid) estimate.

Margin of Error

90% confidence interval
around the estimate.
Represents difference
between sample and
population.

EXAMPLE USING ACS

How good is ACS data for my city?

However, MOEs and CIs are cumbersome.
You get a range of results, but all are statistically equal.

Coefficients of Variation ...

- Easy to understand. Can use the point-estimate.
- Ranges from 0% to no upper limit.
- Higher values indicate poorer data quality.
- Higher MOE, higher CV.
- You decide what is consider "good".
- ACS does not provide. You must calculate.

Coefficient of Variation

Error/unreliability of estimate
expressed as a percentage.

EXAMPLE USING ACS

How good is ACS data for my city?

Coefficients of Variation ...

$$CV = ((MOE / 1.645) / EST) * 100$$

Interpretation guidelines ...

Good < 25% Caution = 25-50% Poor > 50%

EXAMPLE – MOEs and CVs ...

$$\text{Poverty} = 18.2 \quad \text{MOE} = \pm 4.8$$

$$CV = ((4.8 / 1.645) / 18.2) * 100 = 16.0\% \rightarrow \text{Good Estimate}$$

What if MOE was doubled?

$$\text{Poverty} = 18.2 \quad \text{MOE} = \pm 9.6$$

$$CV = ((9.6 / 1.645) / 18.2) * 100 = 27.8\% \rightarrow \text{Cautious Estimate}$$



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EXAMPLE USING ACS

Time to get out your calculators ...

Calculate the following CVs and CIs.

Are the population numbers "good" estimates?

$$CV = ((MOE / 1.645) / EST) * 100$$

$$\text{CI-lower} = (EST - MOE) \quad \text{CI-upper} = (EST + MOE)$$

	Estimate	MOE	CV	Range
Des Moines (ACS 2012)	206,568	173		
Mason City (ACS 2010-2012)	27,959	40		
Clarion (ACS 2008-2012)	2,819	35		
Cambridge (ACS 2008-2012)	825	138		



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EXAMPLE USING ACS

Population ...

Good quality populations estimates across place and period.

Use most populations measures without concern.

	Population				
	<i>Estimate</i>	<i>MOE</i>	<i>CV</i>	<i>Range</i>	
Des Moines (ACS 2012)	206,568	173	0.1	206,395	206,741
Mason City (ACS 2010-2012)	27,959	40	0.1	27,919	27,999
Clarion (ACS 2008-2012)	2,819	35	0.8	2,784	2,854
Cambridge (ACS 2008-2012)	825	138	10.2	687	963

	White Non-Hispanic Population (%)				
	<i>Estimate</i>	<i>MOE</i>	<i>CV</i>	<i>Range</i>	
Des Moines (ACS 2012)	68.8	1.8	1.6	67.0	70.6
Mason City (ACS 2010-2012)	91.0	1.0	0.7	90.0	92.0
Clarion (ACS 2008-2012)	88.9	6.5	4.4	82.4	95.4
Cambridge (ACS 2008-2012)	95.4	3.4	2.2	92.0	98.8

39

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EXAMPLE USING ACS

Income ...

Good quality income estimates, but wide range.

Problem measuring poor populations in small places over time (recession).
Be cautious in using "deep" poverty estimates.

Do NOT use unemployment!

	Median HH Income				
	<i>Estimate</i>	<i>MOE</i>	<i>CV</i>	<i>Range</i>	
Des Moines (ACS 2012)	\$45,001	2,145	2.9	\$42,856	\$47,146
Mason City (ACS 2010-2012)	\$40,318	2,576	3.9	\$37,742	\$42,894
Clarion (ACS 2008-2012)	\$39,125	12,968	20.1	\$26,157	\$52,093
Cambridge (ACS 2008-2012)	\$51,500	10,238	12.1	\$41,262	\$61,738

	Poverty (%)				
	<i>Estimate</i>	<i>MOE</i>	<i>CV</i>	<i>Range</i>	
Des Moines (ACS 2012)	19.0	2.6	8.3	16.4	21.6
Mason City (ACS 2010-2012)	18.1	3.9	13.1	14.2	22.0
Clarion (ACS 2008-2012)	13.9	6.2	27.1	7.7	20.1
Cambridge (ACS 2008-2012)	7.3	4.6	38.3	2.7	11.9

40

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EXAMPLE USING ACS

Housing ...

Surprisingly good estimates of home values over place and period given recession.

Terrible job of vacant housing ... Small numbers and recession makes it a moving target.

	Median Home Value				
	Estimate	MOE	CV	Range	
Des Moines (ACS 2012)	\$118,000	3,071	1.6	\$114,929	\$121,071
Mason City (ACS 2010-2012)	\$97,900	4,211	2.6	\$93,689	\$102,111
Clarion (ACS 2008-2012)	\$75,300	5,777	4.7	\$69,523	\$81,077
Cambridge (ACS 2008-2012)	\$117,100	5,584	2.9	\$111,516	\$122,684

	Vacant Housing Units (%)				
	Estimate	MOE	CV	Range	
Des Moines (ACS 2012)	8.7	1.9	13.3	6.8	10.6
Mason City (ACS 2010-2012)	3.5	1.9	33.0	1.6	5.4
Clarion (ACS 2008-2012)	14.9	5.3	21.6	9.6	20.2
Cambridge (ACS 2008-2012)	7.0	6.2	53.8	0.8	13.2



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CENSUS DATA IN THE 21ST CENTURY

IMPLICATIONS FOR CITIES IN IOWA



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IMPLICATIONS

A tale of two Censuses ...

- Census 2010 is for counting the population ... *for Congress.*
- ACS is for describing the population ... *for govt & business.*

Period v. place ...

- ACS is not annual data, but annual updates of period estimates.
- Period estimates depend on population of the place (city/county).

Urban advantages, rural disadvantages ...

- Excellent and current metro data ... *almost no IA cities get it.*
0.6% of cities and 10.1% of counties in IA.
- Good but recent micropolitan data ... *a few IA cities.*
2.2% of cities and 36.4% of counties in IA.
- Fair/poor and lagged rural data ... *majority of IA cities.*



43

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IMPLICATIONS

Minor in statistics ...

- 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.
- Ranges good, CVs better.

Why the Five-Year Plan did not work ...

- ACS 5-year estimates problematic when there is change.
- Slow to detect changes, slow to detect stability
Slow to pick up effects of Great Recession, slow to detect recovery.
- Cannot estimate communities undergoing rapid change.
Layoffs, expansions, in-migration, all make for unreliable data.



44

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IMPLICATIONS

Data decisions ...

Technically, all values within the CI are equally good.

- Which one to choose? Low, mid, or high?
- ADVICE – Best to use the mid-point estimate. However, if the range is large then chose the low/high estimate and use local knowledge to justify.

One should not use ACS data with high CVs.

- How can I report basic info about my city?
- ADVICE – Report basic indicators (population, income, poverty, etc.) and argue that although the data quality is poor it is the only estimate. Never report detailed indicators with poor data quality.

Federal funding agencies have been slow to offer guidance.

- Can I use poor quality ACS data? Can I report the range?
- ADVICE – Agencies have ignored the issue. Use your judgment in reporting ACS data and provide arguments for your choices.



COMMENTS AND QUESTIONS

What can ISUE do to help cities with ACS data issues?

What challenges has your city faced using ACS data?

THANK YOU



For more information

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I will use this information:					Others will use this information:									
5	4	3	2	1	5	4	3	2	1					
Often				Never	Often				Never					
Quality of presentation/information: Low 1 2 3 4 5 High					IOWA STATE UNIVERSITY Extension and Outreach Session: <u>Census Data in 21st Century</u> Date: <u>October 8, 2014</u> Presenter: <u>David Peters</u> Please circle appropriate response. Write comments on back.					Importance of topic to you: High 5 4 3 2 1 Low				
Knowledge of subject before session: None 1 2 3 4 5 A lot					Knowledge of subject after session: None 1 2 3 4 5 A lot									



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