UNDERSTANDING MARGIN-OF-ERROR

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How to Use and Understand ACS Data

- Sample size and sampling error
- Standard error
- Margin of error
- Confidence intervals
- Statistical testing

ACS Estimates and Sample Size

- Estimates are based on a sample of the population

Year	Final Interviews (Maryland)	Housing Units Estimate (Maryland)	Percent
2017	**36,181**	**2,449,123**	**1.48%**
2016	**37,881**	**2,447,211**	**1.55%**
2015	**38,956**	**2,434,465**	**1.60%**
2014	**39,331**	**2,422,317**	**1.62%**
2013	**37,688**	**2,404,177**	**1.57%**

SAMPLING ERROR & STANDARD ERROR

- **Sampling Error** occurs when estimates are derived from a sample rather than a census (complete count) of the population.

- **Standard Error** is an estimate of sampling error – how precise the survey estimates are to the true population you are trying to measure

SAMPLING ERROR & MARGIN OF ERROR

- **Margin of Error** = standard error for a given confidence interval (typically 90 percent). A measure of the precision of the estimate at a given confidence interval

- Sampling error in the ACS is reported as the estimate "plus or minus" the margin of error

MARGIN OF ERROR (MOE)

- **MOE = 1.645 * Standard Error**
  where 1.645 is used for the 90 pct. confidence interval (CI)
  (use 1.960 for 95% CI; for 99% use 2.576)

- **Use the MOE to construct the Lower and Upper bounds around the estimate**

- **Lower Bound = (estimate – MOE)**
- **Upper Bound = (estimate + MOE)**

MEDIAN HOUSEHOLD INCOME FOR MARYLAND FROM 2017 ACS

Median Household Income for Maryland from 2017 ACS

- 90% CI = $80,776 +/- 707
  = $80,069 to $81,483

- There is a nine-out-of-ten, or 90 % chance, that the interval contains the “true” value that you would have gotten from a full census

Why Margins of Error Matters

- Lets you know how good the data is
- Saves you from drawing erroneous conclusions
- Helps you decide how confident you can be about the assertions you make

Comparing Estimates

- If have two estimates, need to determine if the apparent differences are:
  - Likely due to chance
  - Likely represent a true difference that exists in the population as a whole
- A “statistically significant difference” means that there is statistical evidence that there is a difference

Comparing Estimates

- If the confidence intervals of two estimates do not overlap, then the difference between the two estimates are statistically significant

- If the confidence intervals of two estimates do overlap, then the difference between the two estimates may or may not be statistically significant (will need to test)

TESTING STATISTICAL SIGNIFICANCE

- Absolute value of Difference = ABS(a, b)
- SE(a) = MOE(a)/1.645
- SE(b) = MOE(b)/1.645
- SE(a, b) = $\sqrt{}$([$SE(a)$]2+[$SE(b)$]2)
- MOE (a, b) = SE (a, b)*1.645
- ABS(a, b) <> MOE (a, b)

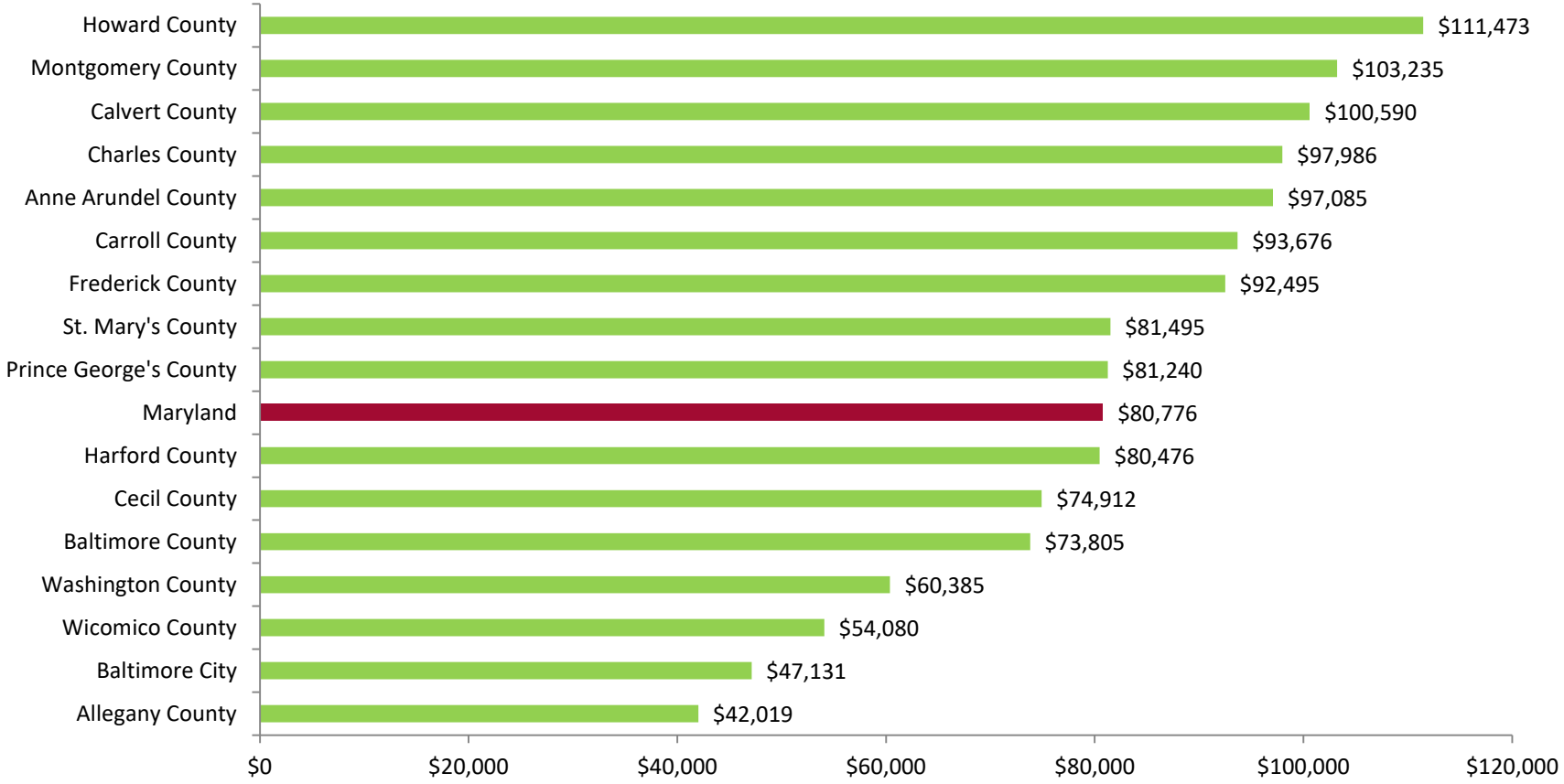
TESTING STATISTICAL SIGNIFICANCE

1. If ABS(a, b) > MOE(a, b), then the difference between the two estimates are statistically significant

2. If ABS(a, b) < MOE (a, b), then the difference between the two estimates are NOT statistically significant

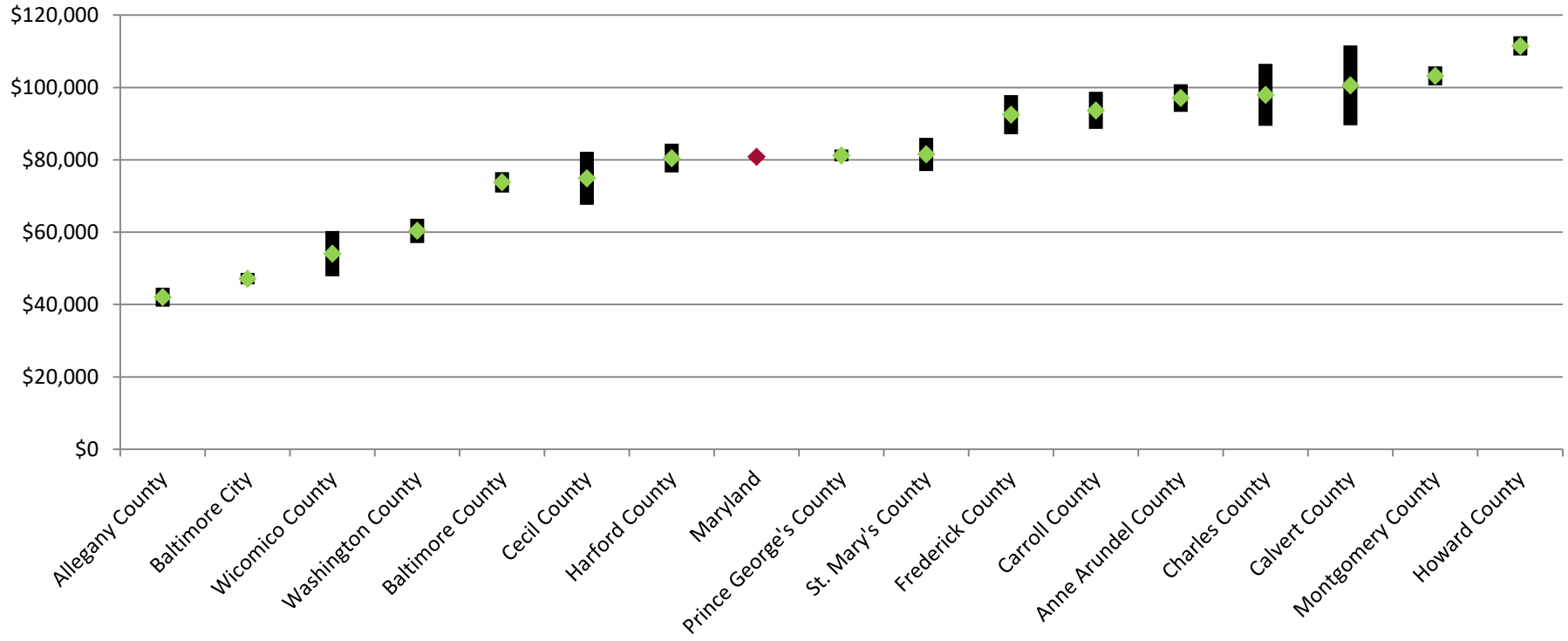
Median Household Income in Maryland and its Jurisdictions, 2017

(In 2017 Inflation-Adjusted Dollars)



Median Household Income in Maryland and its Jurisdictions, 2017

(In 2017 Inflation-Adjusted Dollars, with MoE)



2017 Median Household Income

County	Median HH Income	Margin of Error	Lower Bound	Upper Bound
Howard County	**111,473**	**2,666**	**108,807**	**114,139**
Montgomery County	**103,235**	**2,632**	**100,603**	**105,867**
Calvert County	**100,590**	**11,000**	**89,590**	**111,590**
Charles County	**97,986**	**8,556**	**89,430**	**106,542**
Anne Arundel County	**97,085**	**3,840**	**93,245**	**100,925**

SIGNIFICANCE TEST WORKSHEET

- Go to Statistical Calculations Excel File

RESOURCES

Calculations of Statistical Significance & MOEs of Combinations of ACS Data

https://planning.maryland.gov/MSDC/Documents/American_Community_Survey/StatisticalCalculationsMenu_ForWEB.xls

CONTACT

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