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PLEASE NOTE: The Bureau of Health Care Analysis and Data Dissemination periodically updates the community health assessment and intervention planning tools. The exact screen captures presented in this handbook may not be available in the future.

Microsoft Excel screenshots were created using the 2010 version of the software. Screens may differ in later versions of Microsoft Excel.

Community Data Profiles: [*https://webapp01.dhss.mo.gov/MOPHIMS/ProfileHome*](https://webapp01.dhss.mo.gov/MOPHIMS/ProfileHome)

MICA: [*https://webapp01.dhss.mo.gov/MOPHIMS/MICAHome*](https://webapp01.dhss.mo.gov/MOPHIMS/MICAHome)

Statistics in Health

Terminology Review

The first course in the MOPHIMS training series, *MOPHIMS*: *Introduction to Profiles and MICA*, covered many health statistics that will also be used in this course. Many of these statistics will be used to calculate additional statistics that are not presented in the MICA tools.

Crude rates are "calculated by dividing the total number of events that occur during a specified time period by the total number of individuals in the population who are at risk for these events."[1] This quotient is then multiplied by a constant (generally a multiple of 10, such as 100, 1,000, 10,000, or 100,000, depending on the rarity of the event).

Population at Risk is "a term applied to all those to whom an event could have happened, whether it did or not."[2] Population at risk is often used as the denominator when calculating rates. It may or may not consist of the entire population.

Unreliable rates may be encountered when analyzing data for small areas such as counties or with low frequency (rare) events such as cause-specific mortality or birth defects. For example, suppose that in 2007, one case of influenza occurred in a community of 1,000 people. The rate of flu incidence in 2007 was 1/1,000, or .1%. In 2008, the population was still 1,000 people, but two persons caught the flu. The rate of flu incidence in 2008 was thus 2/1,000, or .2%. The rate of flu incidence doubled, even though the number of cases only increased by one. The MICA system defines unreliable rates as those with a numerator less than 20.

Age-adjusted rates remove "differences in the age composition of two or more populations to allow comparisons between these populations independent of their age structure."[3] Stated another way, age-adjusting allows users to make fairer comparisons between populations with different age structures. Age is the variable most commonly adjusted because the onset of many health conditions is strongly correlated with age. A standard population distribution is used to adjust rates. The age-adjusted rates are the rates that would have existed if the population under study had been distributed in the same way as the 'standard' population.

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[1] Florida Department of Health. (n.d.). *FloridaCHARTS user's guide: Empowering communities with health information.* FloridaCHARTS. http://www.flhealthcharts.com/Charts/documents/CHARTS_USER_GUIDE_8_2012.pdf. Access October 27, 2017.

[2] Austin D. F., and Werner S. B. *Epidemiology for the health sciences: A primer on epidemiologic concepts and their uses*. Springfield, IL: Charles C. Thomas. 1974.

[3] Florida Department of Health. (n.d.). *FloridaCHARTS user's guide: Empowering communities with health information.* FloridaCHARTS.

Incidence is "the frequency with which something, such as a disease, appears in a particular population or area. In disease epidemiology, the incidence is the number of newly diagnosed cases during a specific time period."[4] "Incidence rates have new cases as the numerator and the population at risk for being a case as the denominator."[5]

Prevalence is "the proportion of individuals in a population having a disease. Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time."[6] "The prevalence rate in a base population is the total of new cases occurring [in the current time period] plus any left over [from previous time periods]."[7]

Most prevalence data in Missouri come from surveillance systems that utilize surveys or registries. The Behavioral Risk Factor Surveillance System (BRFSS) is one notable example of survey data used to estimate prevalence. Registry data may be used to determine incidence, prevalence, or both and usually provide the ability to distinguish between prevalence and incidence. For example, all Cancer Registry data are incidence data (or new cases), while HIV Registry data are broken down by both incidence and prevalence.

Significant Difference indicates whether the difference between two rates is probably the result of chance factors or if the difference is meaningful. Significant difference can only be determined with the use of a statistical significance test. In the Profiles and MICA, significant difference is expressed at levels of 95% or 99% confidence.

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[4] MedicineNet.com. *Incidence. MedTerms medical dictionary.* http://www.medterms.com/script/main/art.asp?articlekey=11516. Reviewed May 13, 2016. Accessed October 27, 2017.

[5] Austin D. F., and Werner S. B. *Epidemiology for the health sciences: A primer on epidemiologic concepts and their uses*. Springfield, IL: Charles C. Thomas. 1974.

[6] MedicineNet.com. *Incidence. MedTerms medical dictionary.* http://www.medterms.com/script/main/art.asp?articlekey=11516. Reviewed May 13, 2016. Accessed October 27, 2017.

[7] Austin D. F., and Werner S. B. *Epidemiology for the health sciences: A primer on epidemiologic concepts and their uses*. Springfield, IL: Charles C. Thomas. 1974.

Data from External Organizations

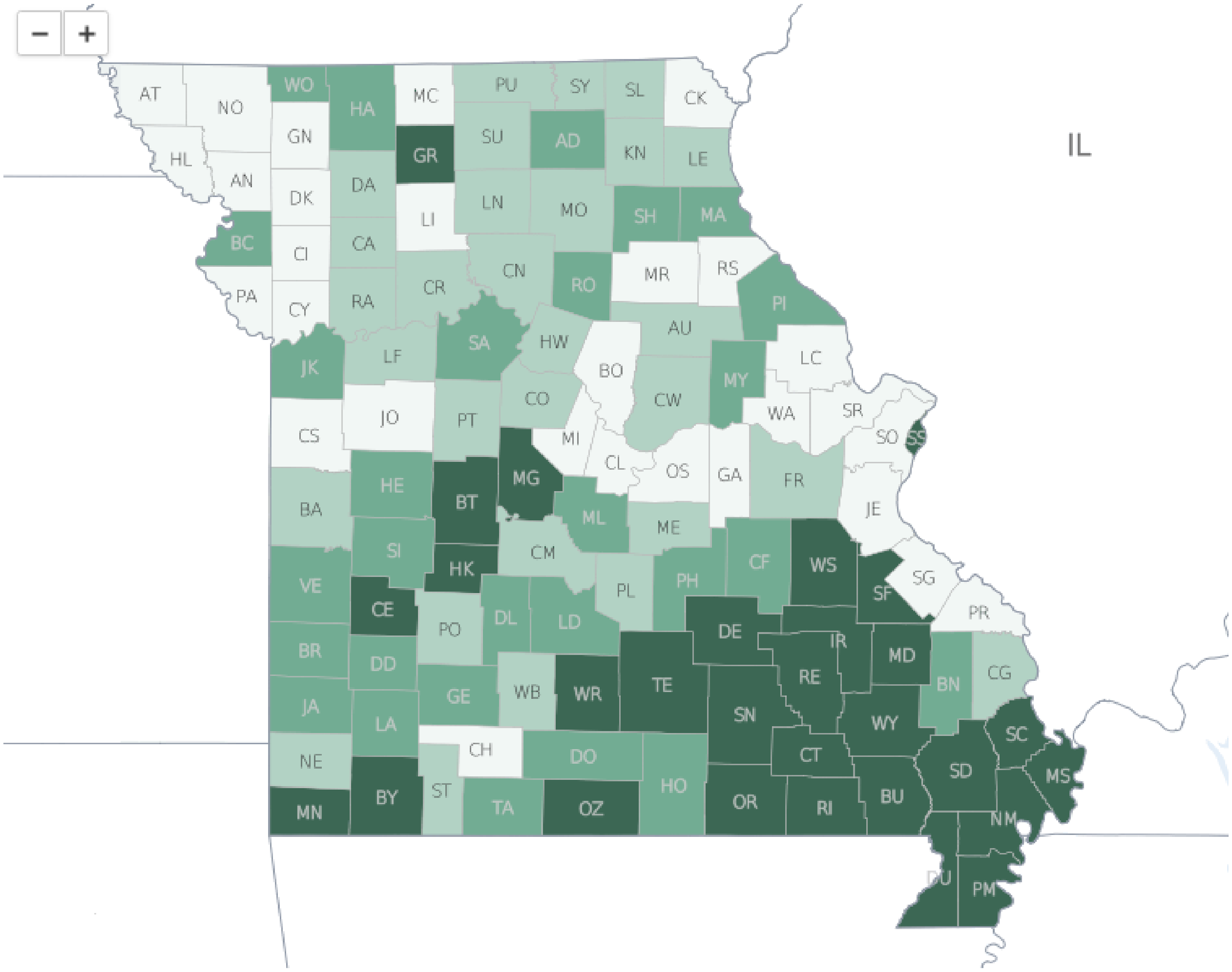
County Health Rankings

The Robert Wood Johnson (RWJ) Foundation, in conjunction with the University of Wisconsin Population Health Institute, has developed County Health Rankings. This is the first set of reports to rank the overall health of every county in the nation. Each county is ranked within its state based on health outcomes and health factors. The rankings for health outcomes and health factors are separate reports. The County Health Rankings are similar to Priorities MICA in that separate rankings are provided for diseases and risk factors.

The County Health Rankings may be useful in assessing a county's overall health status. These rankings take a large amount of information about health conditions and risk factors in each county, compile it into a ranking, and compare each county to the state as a whole. The website http://www.countyhealthrankings.org provides access to maps and tables for Missouri and the other 49 U.S. states. In Missouri, each county is ranked from 1 through 115 for both Health Outcomes and Health Factors. (In some years, Worth County is excluded from the rankings due to insufficient data. In those years, the remaining counties are ranked from 1 through 114.)

There are a couple of important limitations to the County Health Rankings that should be considered. The data used in forming the rankings are generally older than the data found on the Community Data Profiles/MICA. Because of the national scope of the project, the County Health Rankings must wait for all states to have comparable data before updating years. Another consideration is that some indicators take regional rates and assign values to individual counties based on those regional estimates. Tables showing the data years used in the County Health Rankings and comparability of measures across states are available in the Appendix.

The 2018 Health Outcomes Map for Missouri follows.

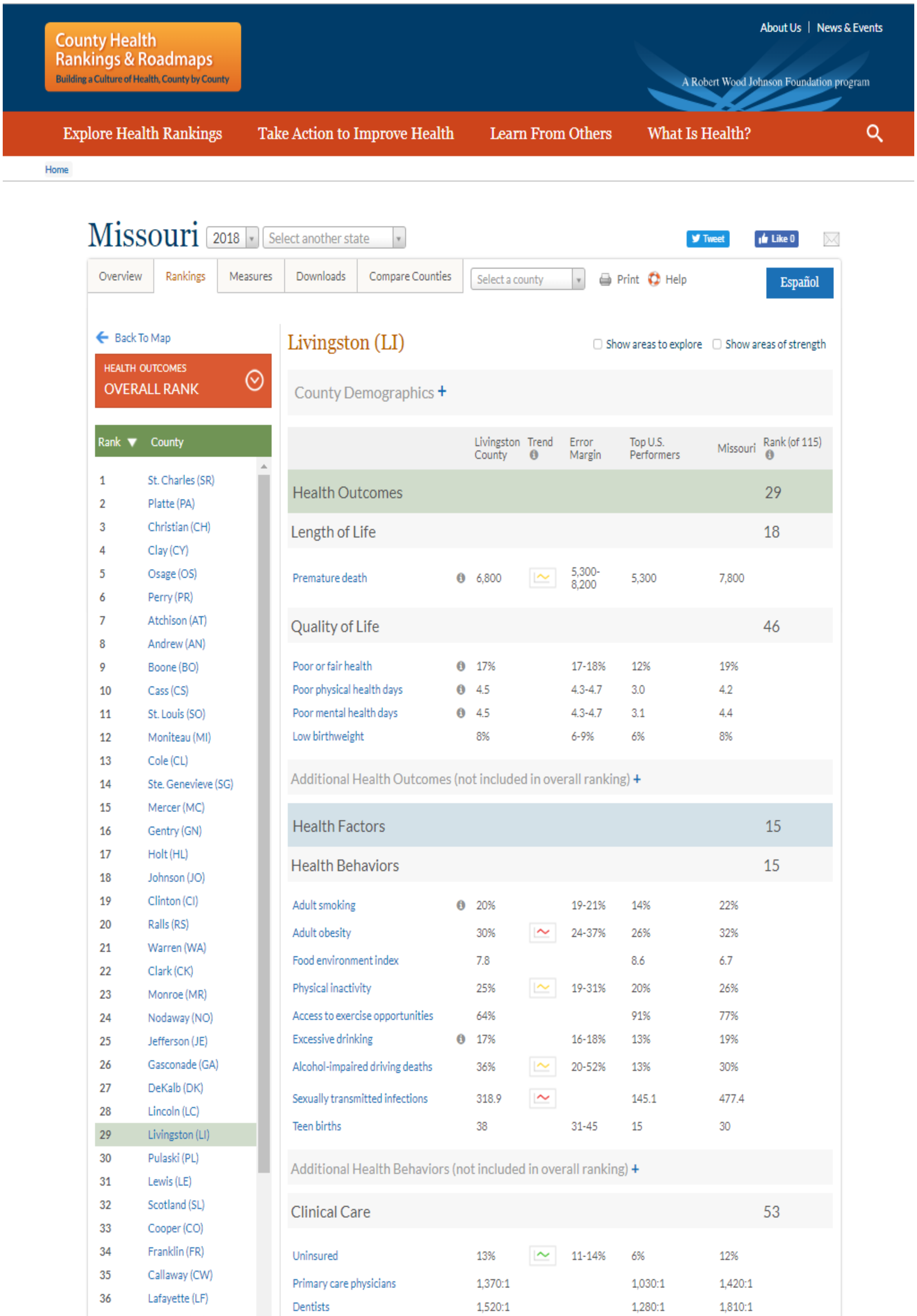


RANK 1 - 29 | 30 - 58 | 59 - 86 | 87 - 115 | NOT RANKED (NR)

Source: Robert Wood Johnson Foundation and University of Wisconsin Population Health Institute

This site also contains links to individual county pages that list the specific statistics used in the ranking calculations. The Health Outcomes section includes statistics on how long people live (mortality) and how healthy people feel while alive (morbidity). The Health Factors section includes statistics on health behaviors, clinical care, social and economic factors, and the physical environment.[8] Next, a portion of the Livingston County table is shown.

[8] Robert Wood Johnson Foundation and University of Wisconsin Population Health Institute



County Health Rankings & Roadmaps
Building a Culture of Health, County by County

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Missouri 2018

Select another state | Tweet | Like 0

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HEALTH OUTCOMES
OVERALL RANK

Rank	County
1	St. Charles (SR)
2	Platte (PA)
3	Christian (CH)
4	Clay (CY)
5	Osage (OS)
6	Perry (PR)
7	Atchison (AT)
8	Andrew (AN)
9	Boone (BO)
10	Cass (CS)
11	St. Louis (SO)
12	Moniteau (MI)
13	Cole (CL)
14	Ste. Genevieve (SG)
15	Mercer (MC)
16	Gentry (GN)
17	Holt (HL)
18	Johnson (JO)
19	Clinton (CI)
20	Ralls (RS)
21	Warren (WA)
22	Clark (CK)
23	Monroe (MR)
24	Nodaway (NO)
25	Jefferson (JE)
26	Gasconade (GA)
27	DeKalb (DK)
28	Lincoln (LC)
29	Livingston (LI)
30	Pulaski (PL)
31	Lewis (LE)
32	Scotland (SL)
33	Cooper (CO)
34	Franklin (FR)
35	Callaway (CW)
36	Lafayette (LF)

Livingston (LI)

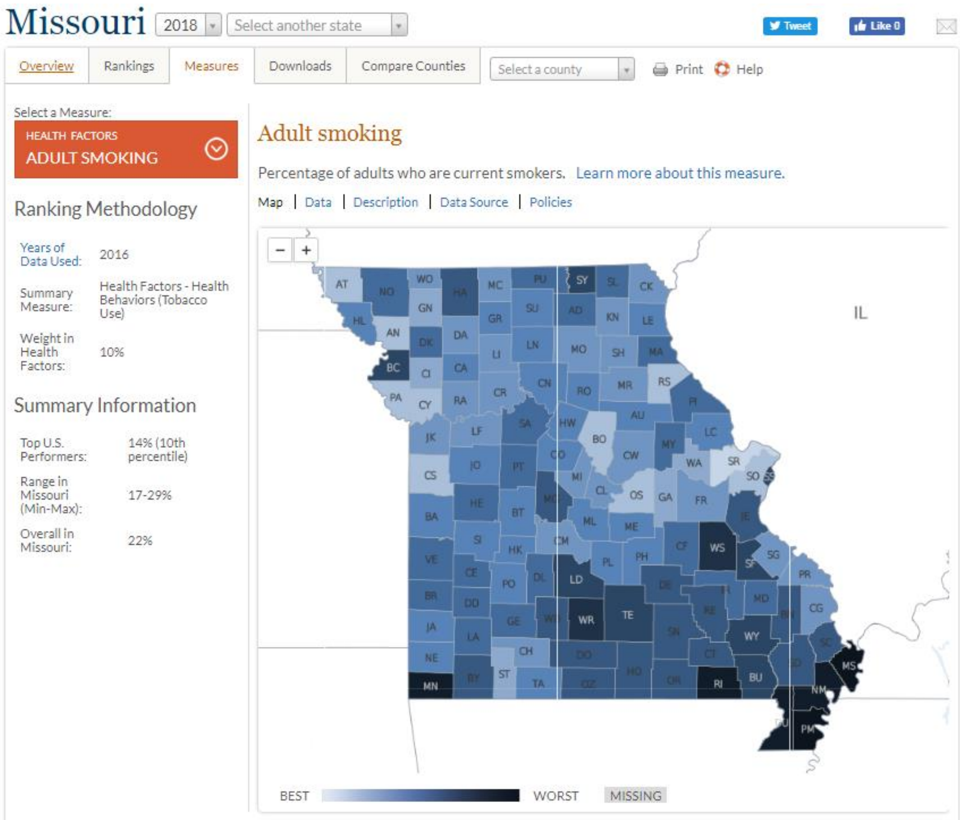
Show areas to explore | Show areas of strength

County Demographics +

	Livingston County	Trend	Error Margin	Top U.S. Performers	Missouri	Rank (of 115)
Health Outcomes						29
Length of Life						18
Premature death	6,800		5,300-8,200	5,300	7,800	
Quality of Life						46
Poor or fair health	17%		17-18%	12%	19%	
Poor physical health days	4.5		4.3-4.7	3.0	4.2	
Poor mental health days	4.5		4.3-4.7	3.1	4.4	
Low birthweight	8%		6-9%	6%	8%	
Additional Health Outcomes (not included in overall ranking) +						
Health Factors						15
Health Behaviors						15
Adult smoking	20%		19-21%	14%	22%	
Adult obesity	30%		24-37%	26%	32%	
Food environment index	7.8			8.6	6.7	
Physical inactivity	25%		19-31%	20%	26%	
Access to exercise opportunities	64%			91%	77%	
Excessive drinking	17%		16-18%	13%	19%	
Alcohol-impaired driving deaths	36%		20-52%	13%	30%	
Sexually transmitted infections	318.9			145.1	477.4	
Teen births	38		31-45	15	30	
Additional Health Behaviors (not included in overall ranking) +						
Clinical Care						53
Uninsured	13%		11-14%	6%	12%	
Primary care physicians	1,370:1			1,030:1	1,420:1	
Dentists	1,520:1			1,280:1	1,810:1	

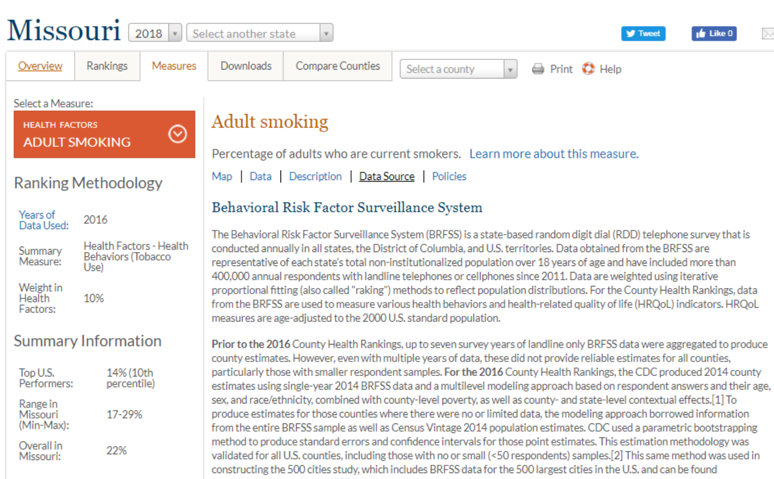
Source: Robert Wood Johnson Foundation and University of Wisconsin Population Health Institute

Clicking on any of the indicator labels reveals a map showing the distribution for that indicator across the state, as well as additional information about the indicator, such as the data years included in the ranking.



Source: Robert Wood Johnson Foundation and University of Wisconsin Population Health Institute

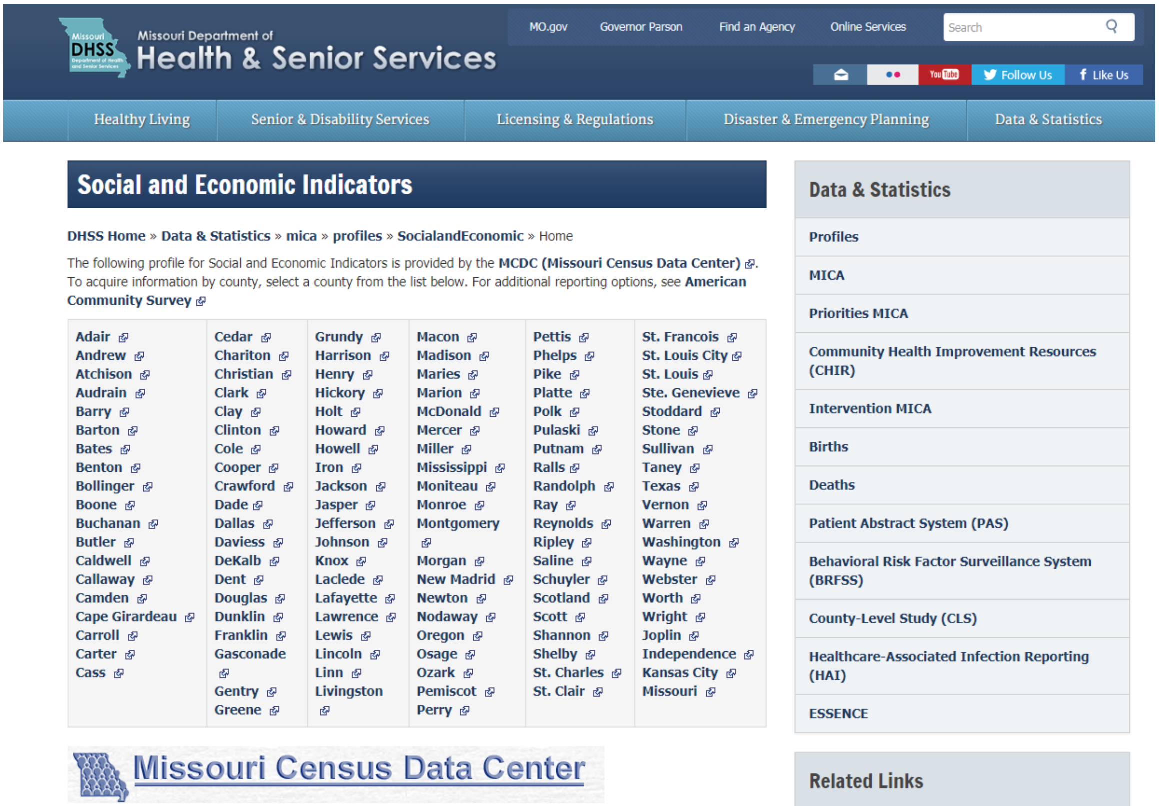
To find additional information about the data, click on one of the tabs above the map. For example, the screenshot below explains the data source for the Adult smoking indicator.



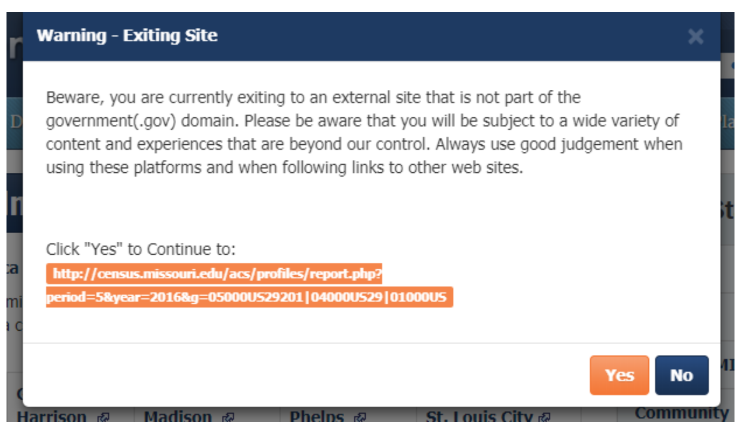
Source: Robert Wood Johnson Foundation and University of Wisconsin Population Health Institute

Social and Economic Indicators Profile

The **Social and Economic Indicators Profile** contains data provided by the Missouri Census Data Center (MCDC).



Once a county is selected, an External Link warning will appear. Select **Okay** to proceed to the MCDC site.



MCDC American Community Survey Profiles

Missouri Census Data Center

ACS Profile Report: 2012-2016 (5-year estimates)

For geographies:

Howell County, Missouri (05000US29091)

Missouri (04000US29)

United States (01000US)

Other formats

- Export data to Excel
- PDF version
- Variable metadata
- ACS Standard Extracts

Usage notes

- Hover mouse pointer over a value for one second to see MOE/confidence interval info.
- Relative margins of error are also indicated by number font. **BOLD** values: RMOE < 15%; NORMAL values: 15% ≤ RMOE < 35%; LIGHT values: RMOE ≥ 35%.
- Click the small chart icon next to a subtitle (below) to view chart(s) of selected data from that table.
- Click a reference table link to see underlying data (provided by the US Census Bureau's American FactFinder application).

Jump to section: [Demographic] [Economic] [Social] [Housing]

The tables provided by the MCDC contain data from the American Community Survey (ACS). The ACS replaced the long form that used to be distributed every ten years with the decennial census. Now the ACS is distributed to a sample of the population each year. This allows the U.S. Census Bureau to collect data more regularly so that population trends for the U.S., states, counties, and most cities can be tracked more closely. The MCDC reports these ACS data on county tables that contain sections on Demographic, Economic, Social, and Housing indicators.

E4. POVERTY STATUS OVER THE LAST 12 MONTHS

Universe: Persons for whom poverty status is determined

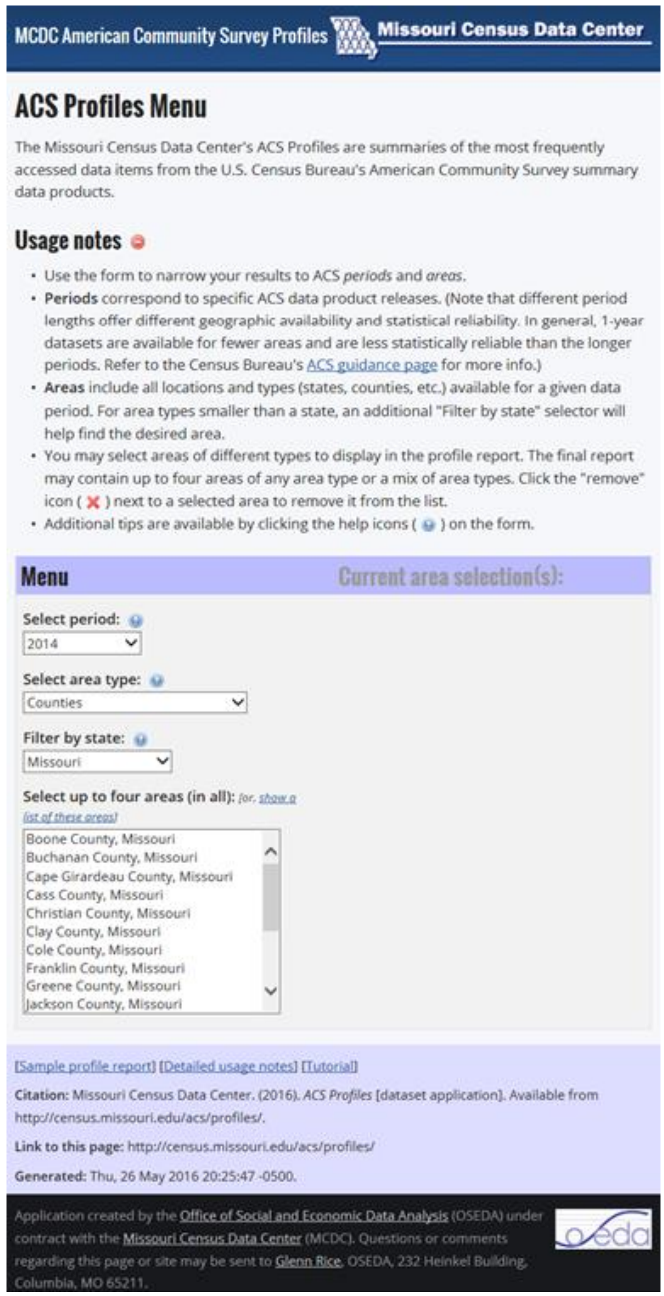
Reference tables: B17001 B17021 B17010 B17007 C17002

Persons for whom poverty status is determined	39,509		5,876,366		310,629,632	
Persons below poverty	8,980	22.7	897,755	15.3	46,932,224	15.1
Persons under 18 for whom poverty status is determined	9,522		1,364,095		72,456,096	
Persons under 18 in poverty	3,143	33.0	287,147	21.1	15,335,783	21.2
Persons aged 18 to 64 for whom poverty status is determined	22,793		3,620,233		193,298,962	
Persons aged 18 to 64 in poverty	4,686	20.6	531,348	14.7	27,401,015	14.2
Persons over 65 for whom poverty status is determined	7,194		892,038		44,874,586	
Persons over 65 in poverty	1,151	16.0	79,260	8.9	4,195,427	9.3
Persons in families for whom poverty status is determined	32,496	82.2	4,695,207	79.9	251,561,651	81.0
Unrelated individuals for whom poverty status is determined	7,013		1,181,159		59,067,988	
Persons in families in poverty	6,579	20.2	568,643	12.1	31,227,522	12.4
Family households in poverty	2,058	18.7	165,384	10.8	8,543,087	11.0
Unrelated persons in poverty 15 years and over	2,401	34.2	329,112	27.9	15,704,704	26.6
Poverty ratio under 0.5	3,825	9.7	395,468	6.7	20,787,162	6.7
Poverty ratio in 0.5 to 0.99	5,155	13.0	502,287	8.5	26,145,064	8.4
Poverty ratio in 1 to 2	10,945	27.7	1,135,295	19.3	57,457,973	18.5
Poverty ratio in 2 and over	19,584	49.6	3,843,316	65.4	206,239,440	66.4

The MCDC tables contain some data that can be found in the MICA system, such as population and racial distribution, although a different time period is represented so the numbers provided will not exactly match MICA. However, many of the indicators available through the ACS and the MCDC are not available in the MICA system. For example, the portion of the Economic section that appears at the right contains several indicators on poverty status with direct comparisons to statewide and national statistics.

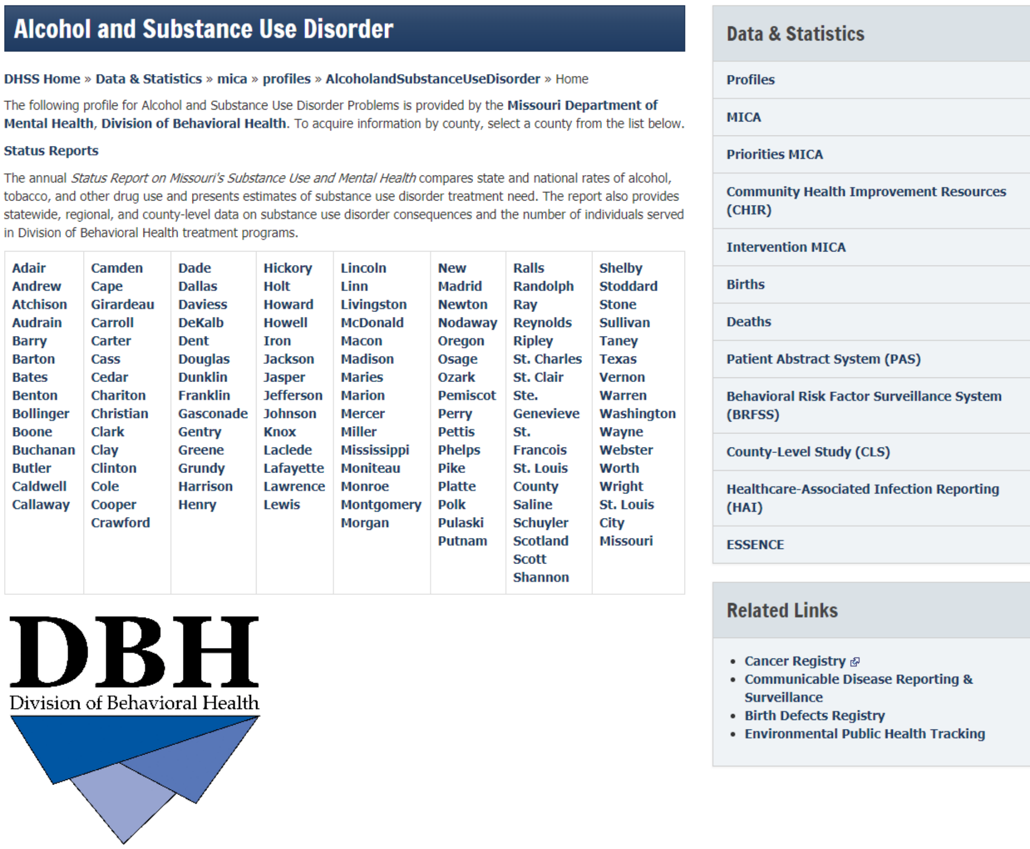
The **Social and Economic Indicators Profile** links to data for the 2012-2016 time period. Similar ACS Profile Reports using smaller time periods are available for larger counties through the query tool at http://mcdc1.missouri.edu/acsprofiles/acsprofilemenu.html. This website can also be accessed through the **MCDC American Community Survey Profiles** link in the upper right corner of the screen.

Single-year 2016 data are available for geographies with populations above 65,000. Five-year 2012-2016 data are available for all geographies. (In the past, three-year data were available for geographies with populations above 20,000, but this option was discontinued after 2013. Earlier three-year time periods, such as 2011-2013, are currently still available on the MCDC site.) Data for the U.S. and other states are also available through this tool.

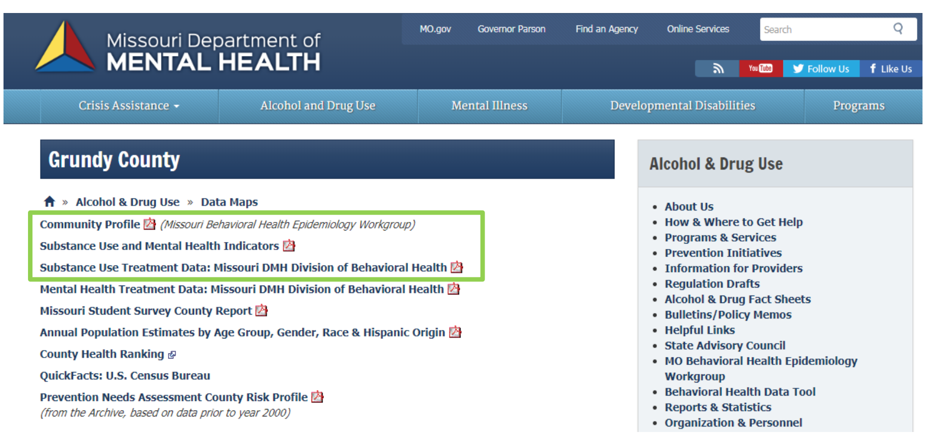


Alcohol and Substance Use Disorder Profile

The **Alcohol and Substance Use Disorder Profile** provides links to data prepared by the Missouri Department of Mental Health.

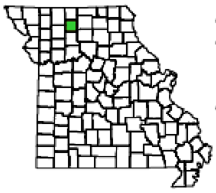


The Department of Mental Health has developed a collection of links for each county in Missouri. The Grundy County links are shown below. Alcohol and drug abuse information is available through the first three links. The Community Profile is a narrative report on substance abuse and mental health.



The Substance Use and Mental Health Indicators sheet contains statistics on several topics related to alcohol and drug abuse, including hospital and emergency room visits, juvenile court referrals, traffic crashes, police reports, school reports, criminal justice cases, and others. A portion of the Grundy County sheet appears below.

GRUNDY COUNTY



DBH REGION	Western
DBH SERVICE AREAS	
Substance Use	13
Adult Psychiatric	13
POPULATION	
Census 2010	10,261
2016 Estimate	10,165

BIRTH RISK	2015	2014	2013
Resident Births	136	170	163
Mother Reported Smoking while Pregnant	31	49	35

DISEASE INCIDENCE [1]	2016	2015	2014
HIV/AIDS Cases	1	1	0
Hepatitis B Chronic, Acute, Prenatal	0	0	1
Hepatitis C Chronic and Acute	7	13	5
Tuberculosis Infection Cases	2	3	2

DEATHS and INJURIES	2015	2014	2013
Resident Deaths	155	144	142
Suicide	1	2	1
Homicide	0	1	0
Alcohol Induced Deaths	0	2	1
Drug Induced Deaths	3	3	1
Smoking Attributable Deaths	15	20	21
Self-inflicted Injuries *	17	10	14
Assault Injuries *	30	31	28

IMPAIRED DRIVING	2016	2015	2014
Alcohol Involved Crashes	6	13	9
Fatal Crashes	0	1	0
Injury Crashes	0	7	3
Property Damage Crashes	6	5	8
Crash Fatalities	0	1	0
Crash Injuries	0	8	5
Drug Involved Crashes	1	1	2
Fatal Crashes	0	0	0
Injury Crashes	0	0	1
Property Damage Crashes	1	1	1
Crash Fatalities	0	0	0
Crash Injuries	0	0	1

POLICE REPORTS	2016	2015	2014
DUI Arrests, DWI Tracking System	29	24	39
Liquor Law Arrests	10	15	27
Drug Arrests	78	56	58
Methamphetamine Lab Seizures	0	0	0
Violent Offenses	9	13	9
Domestic Violence Reports	112	120	121
Property Offenses	154	198	158

SCHOOL REPORTS	2015-16	2014-15	2013-14
Enrollment Grades 9-12	404	412	425
Drop-outs	9	5	8
Drop-out Rate	2.2%	1.2%	1.9%
School Discipline Involving Alcohol	0	0	0
School Discipline Involving Drugs	2	1	0

The Substance Abuse Treatment Data sheet contains data on substance use and compulsive gambling treatment admissions. This data sheet includes information on type of treatment, demographic characteristics of admitted individuals, other services provided, primary drug problem, referral source, special populations such as pregnant women and military veterans, and several other categories.

GRUNDY COUNTY

DIVISION OF BEHAVIORAL HEALTH: SUBSTANCE USE AND COMPULSIVE GAMBLING TREATMENT ADMISSIONS

Some individuals were admitted to more than one category of substance use treatment and are counted once in each category they accessed during the fiscal year:

TREATMENT CATEGORY	FY2017	FY2016	FY2015
Detoxification	9	11	11
CSTAR Adolescent	*	*	5
CSTAR Women and Children	*	*	5
CSTAR General Adult	79	70	63
CSTAR Opioid	0	*	0
Primary Recovery Treatment	0	*	*
Clinical SATOP (CIP, YCIP, SROP)	7	8	8
Other Substance Abuse Treatment	0	0	0

SUBSTANCE ABUSE TRAFFIC OFFENDER PROGRAM (SATOP)	FY2017	FY2016	FY2015
Offender Management Unit	32	29	25
- Adolescent Diversion Education Prograr	0	0	0
- Offender Education Program	11	8	7
- Weekend Intervention Program	9	*	8
(See also Clinical SATOP at left)			
OTHER SERVICES PROVIDED			
Co-Dependency	*	*	*
Compulsive Gambling	0	0	0
Recovery Supports	*	*	0
Early Intervention	9	*	*

The profiles below summarize individuals admitted to Division of Behavioral Health substance use treatment programs. Individuals are counted only once, regardless of their number of admissions within the fiscal year. Individuals admitted only to categories listed in the box above-right are not included below. An asterisk (*) in a data cell indicates the count was fewer than 5 and suppressed to avoid disclosure of identifying information:

NUMBER ADMITTED	FY2017	FY2016	FY2015
Total Individuals	91	77	83
AGE			
Under 18	7	6	5

PRIMARY DRUG PROBLEM	FY2017	FY2016	FY2015
Alcohol	27	24	29
Marijuana / Hashish	26	22	24
Cocaine (total)	0	0	0

Percentage Change/Percentage Difference

You will often need to analyze changes in your study area over time, compare different groups within your study area, or compare your study area to another area. One of the simplest ways to analyze these changes or differences is to calculate the percentage change or percentage difference. **Percentage change** can be used to compare differences in rates from the same geographic area *over time*. **Percentage difference** can be used to compare differences in rates from different geographic areas or compare rates for different demographic groups (based on age, race, gender, etc.) within a single area *for the same time period*.

In order to perform either calculation, you need two numbers to compare. For percentage change, you would compare two numbers or rates for the same indicator and the same location but from different time periods (i.e., Cole County 2003 mortality rate vs. Cole County 2017 mortality rate). For percentage difference, you would compare two numbers or rates from the same time period but for different places (i.e., Jackson County 2002 mortality rate vs. St. Louis County 2017 mortality rate) or for different demographic groups (i.e., 2017 Cole County male mortality rate vs. 2017 Cole County female mortality rate, 2017 Cole County African-American mortality rate vs. 2017 Cole County White mortality rate, etc.).

The calculation for percentage change/percentage difference is based on five steps:

1) Obtain the numbers or rates for both time periods/areas/groups.
2) Choose one number to serve as the base value and one to serve as the comparison value.
3) Subtract the base value from the comparison value.
4) Divide the difference calculated in Step 3 by the base value.
5) Multiply the answer from Step 4 by 100 to convert it to a percentage.

These steps can also be written as a formula:

$$\frac{(\text{Comparison Value} - \text{Base Value})}{\text{Base Value}} \times 100 = \text{Percentage Change/Percentage Difference}$$ [9]

Examples will illustrate the process of performing these calculations using data from the MICAs or Profiles.

[9] Steps and formula adapted from the North Carolina Department of Health and Human Services *Community Assessment Guide Book*, 65

Percentage Change Example: Calculate Madison County's percentage change in heart disease mortality rates using data from 2002 and 2017.

1) We must use the Death MICA to determine that the age-adjusted 2003 heart disease death rate for Madison County was 277.05 per 100,000, while the 2017 rate was 253.58 per 100,000.
2) When making comparisons over time, the base year must be the older of the two time periods under consideration. Thus, in this case, the 2003 rate of 277.05 must be used as the base value. The 2017 rate of 253.58 becomes the comparison value.
3) When we subtract the comparison value from the base value, we calculate 253.58 – 277.05 = -23.47.
4) The difference from Step 3 divided by the base value = -23.47/277.05 = -.0847.
5) Multiplying the answer from Step 4 by 100 gives us -.0847x 100 = -8.47%.

Madison County's percentage change in heart disease mortality rates $= \frac{253.58 - 277.05}{277.05} \times 100 = -8.47\%$

In a report, we could state that Madison County's death rate from heart disease decreased by 8.5% between 2003 and 2017.

The same basic steps are used to perform a percentage difference calculation. The main difference between the two calculations is that percentage change analyzes linear (time) data, while percentage difference analyzes non-linear data. The percentage difference calculation can be used to compare genders, age groups, racial groups, or any number of other variables. Although the calculation is the same, analysis of percentage difference requires extra caution related to the choice of base values. An example will illustrate this point.

Percentage Difference Example: Calculate the percentage difference in premature birth rates between African-Americans and Whites in Missouri for 2017.

We can use the Birth MICA to find that the 2017 premature birth rate (preterm gestation) for Whites was 9.75% (or 9.75 per 100), while for African-Americans it was 14.76% (or 14.76 per 100). Now we must decide which rate to use as the base value. When calculating percentage difference, the analyst could choose to use either value as the base value. We will perform the calculation both ways to demonstrate the differences.

White rate as base:

$\frac{14.76 - 9.75}{9.75} = 0.5138 \times 100 = 51.4\%$

African-American rate as base:

$\frac{9.75 - 14.76}{14.76} = -0.3394 \times 100 = -33.9\%$

The first calculation uses Whites as the base and thus compares the African-American rate to the base rate for Whites. If writing a report, we would say:

The 2017 premature birth rate for African-Americans in Missouri was 51% higher than the rate for Whites.

OR

If we choose to use African-Americans as the base and compare the White rate to the African-American base rate, we would say:

The 2017 premature birth rate for Whites in Missouri was 34% lower than the rate for African-Americans.

NOTE: As this example demonstrates, the percentage difference changes depending on which group is used as the base. You must use caution when writing your report so that you appropriately reflect which subpopulation was used as the base and which was used as the comparison value in your percentage difference calculation.

Context must be considered and reported when using percentage change and percentage difference. Otherwise these statistics may provide a distorted interpretation of the data. For example, suppose County A had an immunization rate of 90% in 2008, whereas County B's immunization rate in the same year was 55%. In 2009, County A's immunization rate was 88%, while County B's rate increased to 75%. Thus, the percentage change for County A was -2.2%, while the percentage change for County B was +36.4%.

County A: $\frac{.88 - .90}{.90} \times 100 = -2.2\%$ County B: $\frac{.75 - .55}{.55} \times 100 = +36.4\%$

However, even though County B achieved a greater improvement in its immunization rate, County A's rate was still 13% higher than County B's rate for 2009. Furthermore, since County A's 2008 rate was 90%, County A could only have improved by a maximum of 10% (100% - 90%), while County B could have improved by as much as 45% (100% - 55%). Keep in mind that percentage change and percentage difference do not involve testing for statistical significance. For some data, analysts may therefore wish to utilize confidence intervals when comparing two areas, populations, or data years.

Statistics in Health Exercises – Part I

1. You are researching health disparities in Jackson County.

    a) Use the following rates of hospitalizations due to congestive heart failure to calculate the 2008 percentage difference in discharge rates between Blacks and Whites in Jackson County.

       Rate for Whites: 24.2
       Rate for Blacks: 54.8

       Base Group: Percentage Difference:

    b) Report your findings using a narrative sentence: ____________________________

       ____

       ____

    c) The 95% confidence interval for Whites is 22.9 to 25.5. The 95% confidence interval for Blacks is 50.9 to 58.9. Based on this information, is there a significant difference between the White and Black rates?
       -

       ____

       ____

Years of Potential Life Lost (YPLL)

Even when death rates are age-adjusted, certain diseases and conditions will be given more weight in death rate calculations due to the fact that these diseases and conditions disproportionately affect the elderly, who are more likely to die. Traditional mortality calculations therefore give less weight to conditions that disproportionately affect the young and thus "do not fully account for the burden of premature mortality, an important indicator of a population's health status."[10]

"Years of potential life lost (YPLL) involves estimating the average time a person would have lived had he or she not died prematurely. This measure is used to help quantify social and economic loss owing to premature death, and it has been promoted to emphasize specific causes of death affecting younger age groups."[11] **YPLL is an important measure for public health because "deaths at younger ages are more likely to be attributable to preventable causes and therefore subject to prevention and intervention."**[12]

Most federal and state agencies use age 75 as the benchmark for YPLL calculations. This is sometimes expressed as $YPLL_{75}$. Alternatively, the average life expectancy or age 65 is also sometimes used as benchmarks for YPLL calculations. On the DHSS website, the age of 75 is used to calculate YPLL. As an example, a YPLL calculation for an individual record is:

75 - age of death = individual YPLL[13]

For example, if a newborn baby dies from birth complications, he or she would have a YPLL of 75 (75 – 0 = 75). A 16-year-old teen who dies in a traffic accident would receive a YPLL of 59 (75 – 16= 59). A 73-year-old person who dies of a heart attack would receive a YPLL of 2 (75 – 73= 2). Any person who dies at age 75 or above is not considered to have died prematurely and would receive a YPLL of 0.

---

[10] Dranger E., and Remington P. *YPLL: A summary measure of premature mortality used in measuring the health of communities*. Wisconsin Public Health and Health Policy Institute Issue Brief. http://uwphi.pophealth.wisc.edu/publications/issue-briefs/issueBriefv05n07.pdf. October, 2004. Accessed October 27, 2017.

[11] Gardner J. W., and Sanborn J. S. *Years of potential life lost (YPLL) – What does it measure?* [Abstract]. *Epidemiology 1*(4), 322-329. http://www.ncbi.nlm.nih.gov/pubmed/2083312. July, 1990. Accessed October 27, 2017.

[12] Dranger E., and Remington P. *YPLL: A summary measure of premature mortality used in measuring the health of communities*. Wisconsin Public Health and Health Policy Institute Issue Brief. http://uwphi.pophealth.wisc.edu/publications/issue-briefs/issueBriefv05n07.pdf. October, 2004. Accessed October 27, 2017.

[13] CDC - Principles of Epidemiology in Public Health Practice, Third Edition An Introduction to Applied Epidemiology and Biostatistics. Lesson 3: Measures of Risk. **https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson3/section3.html** . May 1, 2017.

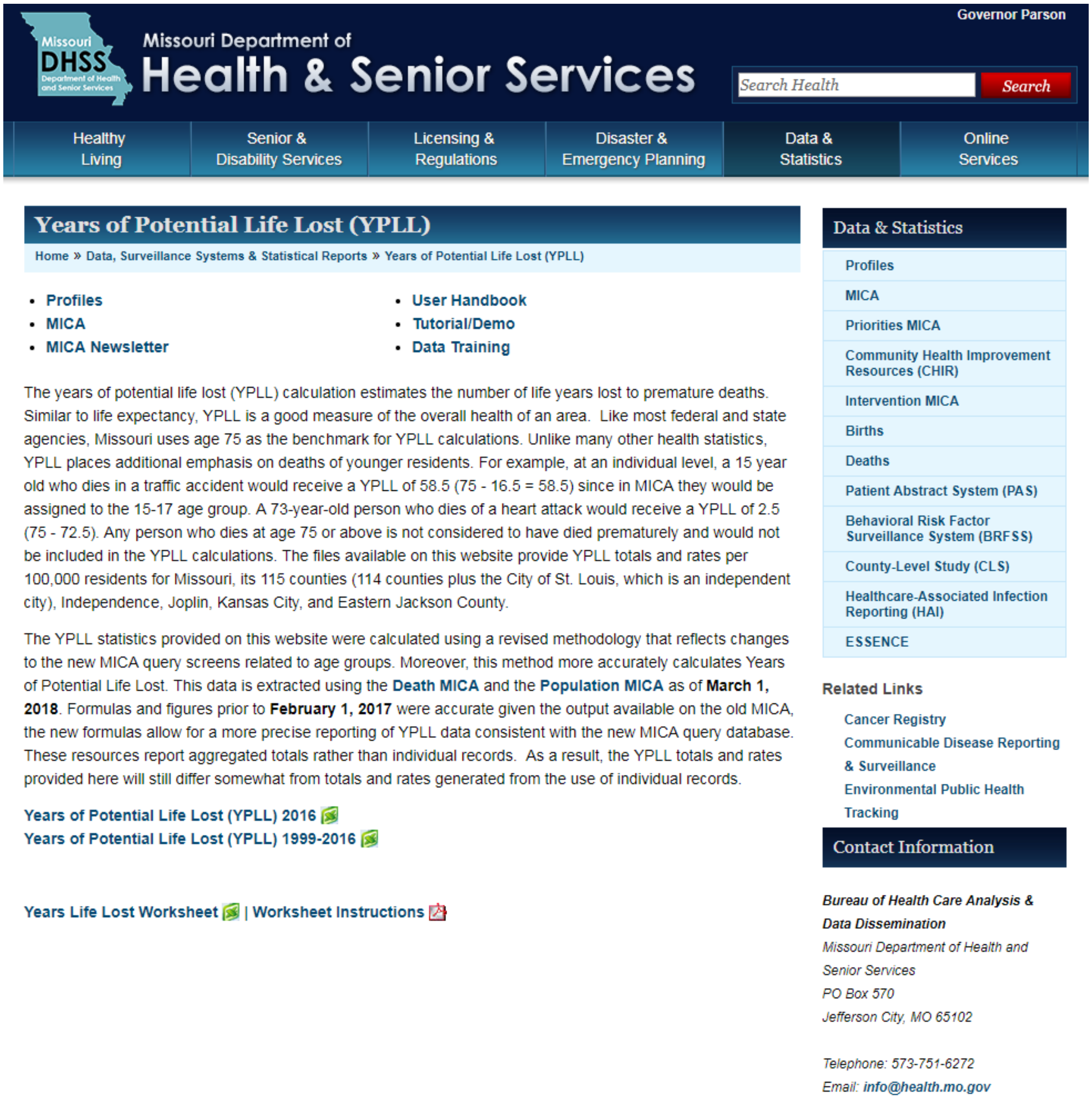
Calculating YPLL for groups of mortality in which the exact age of death is not available for each member of the cohort is slightly different. In these cases, analysts must subtract the midpoint of the age grouping (shown in the table below) from the end point to determine the years of potential life lost for the group. Often, it is helpful to convert the YPLL to a rate, especially if comparisons are being made between geographies, demographic groups, or specific causes of death.

Persons age 75 and above are not included when calculating the YPLL rate. To calculate a YPLL rate:

(YPLL for Region Specified / Population for Region Specified Under Age 75) * 100,000
*Note the 100,000 is a constant generally used for death rates.

Years of Potential Life Lost ($YPLL_{75}$) Midpoints			
Age group	End point	Midpoint by age group	**YPLL for each age group**
Under 1	75	0.5	**74.5**
1 to 4	75	3	**72**
5 to 9	75	7.5	**67.5**
10 to 14	75	12.5	**62.5**
15 to 17	75	16.5	**58.5**
18 to 19	75	19	**56**
20 to 24	75	22.5	**52.5**
25 to 29	75	27.5	**47.5**
30 to 34	75	32.5	**42.5**
35 to 39	75	37.5	**37.5**
40 to 44	75	42.5	**32.5**
45 to 49	75	47.5	**27.5**
50 to 54	75	52.5	**22.5**
55 to 64	75	60	**15**
65 to 69	75	67.5	**7.5**
70 to 74	75	72.5	**2.5**

The Bureau of Health Care Analysis and Data Dissemination (BHCADD) has developed a Years of Potential Life Lost (YPLL) website that explains this statistic, provides YPLL counts and rates for both the state and individual counties, and includes a worksheet and instructions for calculating YPLL statistics other than those available for download. A link to this website is available on the Data, Surveillance Systems & Statistical Reports page under the Community Health Assessment and Intervention Planning header. The YPLL website (http://health.mo.gov/data/ypll/) is shown here.



Governor Parson

Missouri DHSS Department of Health and Senior Services

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Years of Potential Life Lost (YPLL)

Home » Data, Surveillance Systems & Statistical Reports » Years of Potential Life Lost (YPLL)

- **Profiles**
- **MICA**
- **MICA Newsletter**
- **User Handbook**
- **Tutorial/Demo**
- **Data Training**

The years of potential life lost (YPLL) calculation estimates the number of life years lost to premature deaths. Similar to life expectancy, YPLL is a good measure of the overall health of an area. Like most federal and state agencies, Missouri uses age 75 as the benchmark for YPLL calculations. Unlike many other health statistics, YPLL places additional emphasis on deaths of younger residents. For example, at an individual level, a 15 year old who dies in a traffic accident would receive a YPLL of 58.5 (75 - 16.5 = 58.5) since in MICA they would be assigned to the 15-17 age group. A 73-year-old person who dies of a heart attack would receive a YPLL of 2.5 (75 - 72.5). Any person who dies at age 75 or above is not considered to have died prematurely and would not be included in the YPLL calculations. The files available on this website provide YPLL totals and rates per 100,000 residents for Missouri, its 115 counties (114 counties plus the City of St. Louis, which is an independent city), Independence, Joplin, Kansas City, and Eastern Jackson County.

The YPLL statistics provided on this website were calculated using a revised methodology that reflects changes to the new MICA query screens related to age groups. Moreover, this method more accurately calculates Years of Potential Life Lost. This data is extracted using the **Death MICA** and the **Population MICA** as of **March 1, 2018**. Formulas and figures prior to **February 1, 2017** were accurate given the output available on the old MICA, the new formulas allow for a more precise reporting of YPLL data consistent with the new MICA query database. These resources report aggregated totals rather than individual records. As a result, the YPLL totals and rates provided here will still differ somewhat from totals and rates generated from the use of individual records.

Years of Potential Life Lost (YPLL) 2016
Years of Potential Life Lost (YPLL) 1999-2016

Years Life Lost Worksheet | **Worksheet Instructions**

Data & Statistics

- Profiles
- MICA
- Priorities MICA
- Community Health Improvement Resources (CHIR)
- Intervention MICA
- Births
- Deaths
- Patient Abstract System (PAS)
- Behavioral Risk Factor Surveillance System (BRFSS)
- County-Level Study (CLS)
- Healthcare-Associated Infection Reporting (HAI)
- ESSENCE

Related Links

- Cancer Registry
- Communicable Disease Reporting & Surveillance
- Environmental Public Health Tracking

Contact Information

Bureau of Health Care Analysis & Data Dissemination
Missouri Department of Health and Senior Services
PO Box 570
Jefferson City, MO 65102

Telephone: 573-751-6272
*Email: **info@health.mo.gov***

YPLL counts and rates for all causes of death and all Missouri residents are available through downloadable Microsoft Excel files. However, YPLL can also be an effective statistic for specific causes of death, especially those such as motor vehicle accidents that disproportionately affect younger persons, or for comparing different demographic groups. The YPLL Worksheet can be used to calculate these more specific statistics. For example, suppose an analyst is asked to calculate the 2015 YPLL rate for motor vehicle accident (MVA) deaths in Missouri.

The analyst can use **Death MICA** to determine the number of deaths in each age category. Select **Age**: Expanded and expand the Accidents **Cause** category to check Motor vehicle accidents. Choose Main Row: Age and Main Column: Year to produce the following results for Missouri.

Table Results

Save Table As ▾ | Send Table to Side by Side

Title:	**Missouri Resident Deaths**	
Data selected in addition to rows and columns below:	Cause: Accidents (unintentional injuries)#: Motor vehicle accidents;	
Year:	2015	2015
Statistics:	Count	Rate
Age		
Under 1	0	0.00
1 - 4	4	1.34 *
5 - 9	10	2.58 *
10 - 14	10	2.57 *
15 - 17	38	15.85
18 - 19	35	22.26
20 - 24	98	22.78
25 - 29	92	22.68
30 - 34	70	17.45
35 - 39	50	13.46
40 - 44	46	12.74
45 - 49	64	17.11
50 - 54	72	16.70
55 - 59	72	16.74
60 - 64	48	12.80
65 - 69	52	16.63
70 - 74	36	15.63
75 - 79	32	19.38
80 - 84	34	28.30
85 and Over	31	24.46
Unknown	0	0.00
Total for selection	894	14.23
Rate:	**For each Age: Crude Rate per 100,000 Total for selection: Age Adjusted Rate per 100,000 using 2000 Standard Population**	
Source:	**DHSS - MOPHIMS - Death MICA**	
Generated On:	**10/17/2017 3:39:20 PM**	
*	**Rate is unreliable; numerator less than 20**	

The analyst can then download the MICA table into Excel by clicking the green **Save Table As** button and choosing 'Excel'. The YPLL Worksheet assigns values to the mid-age population for each of the age groups because single-year-of-age death data is not available on MICA. The following table summarizes the calculations from the YPLL Worksheet:

Age	Number of Deaths	Mid-Age Population	Formula	Formula Result
Under 1	0	0.5	(75-0.5)*deaths	0
1 to 4	4	3	(75-3)*deaths	288
5 to 9	10	7.5	(75-7.5)*deaths	675
10 to 14	10	12.5	(75-12.5)*deaths	625
15 to 17	38	16.5	(75-16.5)*deaths	2223
18 to 19	35	19	(75-19)*deaths	1960
20 to 24	98	22.5	(75-22.5)*deaths	5145
25 to 29	92	27.5	(75-27.5)*deaths	4370
30 to 34	70	32.5	(75-32.5)*deaths	2975
35 to 39	50	37.5	(75-37.5)*deaths	1875
40 to 44	46	42.5	(75-42.5)*deaths	1495
45 to 49	64	47.5	(75-47.5)*deaths	1760
50 to 54	72	52.5	(75-52.5)*deaths	1620
55 to 59	72	57.5	(75-57.5)*deaths	1260
60 to 64	48	62.5	(75-62.5)*deaths	600
65 to 69	52	67.5	(75-67.5)*deaths	390
70 to 74	36	72.5	(75-72.5)*deaths	90
75 to 84				
85 and over				
All ages				
Total				27351

The analyst now knows the total YPLL from MVA deaths in Missouri (27,351 years), but still needs to convert the total YPLL into a rate so that fair comparisons can be made across different geographies with different population sizes. To convert the total YPLL into a rate the analyst must first divide the total YPLL by the population under age 75. Users can access **Population MICA** to find that, in 2015, there were 5,671,712 Missouri residents under age 75. Then multiply by a constant so that the end result will be greater than or equal to 1, which allows for easier interpretation by users. The standard constant to use for YPLL is 100,000. Thus, the formula for calculating the Missouri rate of YPLL from MVA deaths is:

YPLL Rate = (Total YPLL / Population under age 75) * 100,000

YPLL Rate = (27,351 / 5,671,712) * 100,000 = 482

The report could state:

Missouri had 482 years of potential life lost per 100,000 residents in 2015. This was a decrease from 2001, when the rate was 723 per 100,000 residents.

Another option would be to run in **Population MICA** the same type of query that was created in **Death MICA**. The analyst could then export that data and plug it into the YPLL Worksheet:

Age	Number of Deaths	Mid-Age Population	Formula	Formula Result		Age	Population
Under 1	0	0.5	(75-0.5)*deaths	0		Under 1	75,042
1 to 4	4	3	(75-3)*deaths	288		1 to 4	299,318
5 to 9	10	7.5	(75-7.5)*deaths	675		5 to 9	387,978
10 to 14	10	12.5	(75-12.5)*deaths	625		10 to 14	389,347
15 to 17	38	16.5	(75-16.5)*deaths	2223		15 to 17	239,791
18 to 19	35	19	(75-19)*deaths	1960		18 to 19	157,230
20 to 24	98	22.5	(75-22.5)*deaths	5145		20 to 24	430,169
25 to 29	92	27.5	(75-27.5)*deaths	4370		25 to 29	405,591
30 to 34	70	32.5	(75-32.5)*deaths	2975		30 to 34	401,176
35 to 39	50	37.5	(75-37.5)*deaths	1875		35 to 39	371,574
40 to 44	46	42.5	(75-42.5)*deaths	1495		40 to 44	361,101
45 to 49	64	47.5	(75-47.5)*deaths	1760		45 to 49	374,058
50 to 54	72	52.5	(75-52.5)*deaths	1620		50 to 54	431,233
55 to 59	72	57.5	(75-57.5)*deaths	1260		55 to 59	430,236
60 to 64	48	62.5	(75-62.5)*deaths	600		60 to 64	374,906
65 to 69	52	67.5	(75-67.5)*deaths	390		65 to 69	312,664
70 to 74	36	72.5	(75-72.5)*deaths	90		70 to 74	230,298
75 to 84						75 to 84	
85 and over						85 and over	
All ages						All ages	
Total				27351			
Population Under 75				5671712		Population U75	5671712
YPLL per 100,000				**482**			

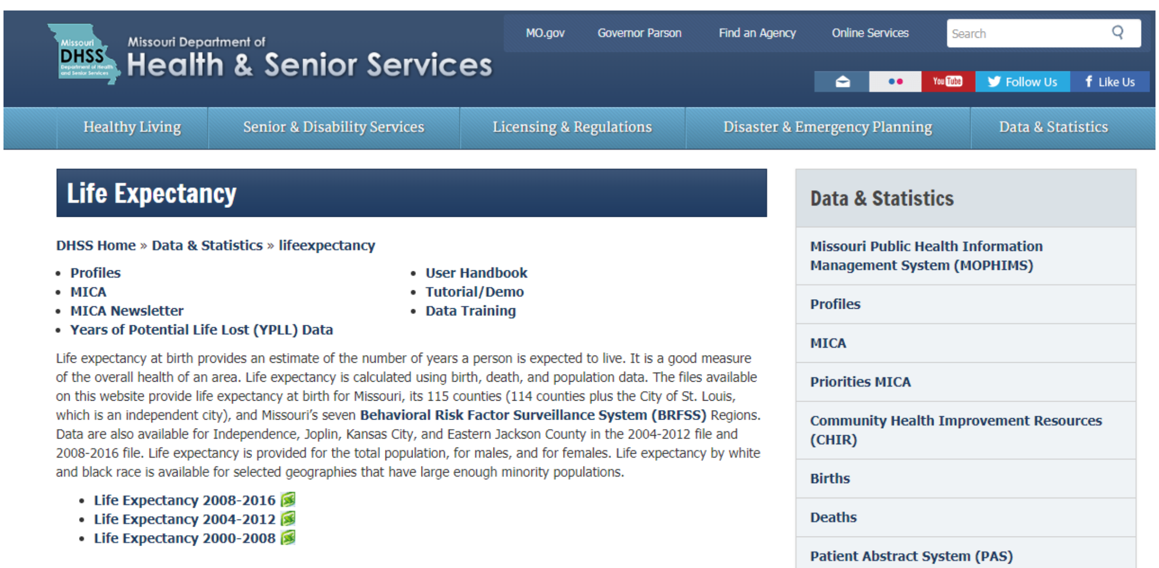
The blue cell at the bottom of the worksheet features a background formula that contains the $YPLL_{75}$ rate calculation and displays the result. Using the worksheet is especially handy if analysts are calculating multiple causes of death from the same geography with the same U75 population.

Life Expectancy

Life expectancy refers to "the average number of years of life remaining [for] a person at a particular age and is often used as a summary measure of the health status of a population. The most commonly used life expectancy measure is life expectancy at birth, [which is] the number of years a person born in a given year is expected to live."[14]

The *Annual Vital Statistics* reports at http://health.mo.gov/data/vitalstatistics/data.php provide life expectancy tables for Missouri only. Older, county-specific life expectancy rates as of 1998-2002 can be obtained from the Office of Administration's Office of Budget and Planning website at https://oa.mo.gov/budget-planning/demographic-information/population-projections/additional-information.

The Bureau of Health Care Analysis and Data Dissemination has developed a Life Expectancy website (http://www.health.mo.gov/data/lifeexpectancy/) that provides county-specific rates for more current time periods. A link to this website is available on the Data, Surveillance Systems & Statistical Reports page under the Community Health Assessment and Intervention Planning header. The Life Expectancy home page is shown below. Life expectancy rates for Missouri, its 115 counties, Independence, Joplin, Kansas City, Eastern Jackson County, and Missouri's seven Behavioral Risk Factor Surveillance System regions are available for two separate time periods through downloadable Microsoft Excel files. Life expectancy rates by White and Black/African-American race are provided for the state and counties with large African-American populations.



[14] New Jersey Department of Health and Senior Services. *Center for Health Statistics information for local health officers*. https://www26.state.nj.us/doh-shad/resources/LHOinfo.html. Last modified, October 17, 2017. Accessed October 27, 2017.

Statistics in Health Exercises – Part II

2. The Buchanan County Health Center is contacted by a local journalist. She is very concerned about some data she found on the Department of Health and Senior Services' MICA website. While researching an article on obesity in Buchanan County, she discovered the 2015 rate of obesity among white children participating in the WIC program is 19.20%! The rate for black children is only 8.54%. She would like someone at the Health Center to comment on this disparity.

   a) How many cases does the 8.54% rate reflect? ______________________________

      Is this a stable rate? ____

      If not, how many years must be included to produce a stable rate? _____________

      ____

   b) How many cases does the 19.20% rate reflect? _____________________________

      Is this a stable rate? ____

      If not, how many years must be included to produce a stable rate? _____________

      ____

   c) Add years 2013, 2014, and 2015 to the data table. Do the available data indicate a health disparity in Buchanan County?
      ____
      ____

   d) What other type of health statistic would be useful for answering this question? Can we add this to our data table? If so, do so to the table with three years of data present.____
      ____

   e) What would you say to the journalist? ____________________________________

      ____

      ____

      ____

3. A citizen's group is concerned about a series of premature deaths from accidents. The group asks the St. Louis County LPHA to provide some statistics on Years of Potential Life Lost all unintentional injuries so they can compare the 2011-2015 rate for St. Louis County to that of the state. Use the YPLL Worksheet to calculate the 2011-2015 YPLL rate from unintentional injuries for St. Louis County.

   a) Which MICAs would you use to find the information to calculate YPLL?

      ____

   b) How many years of potential life were lost in St. Louis County due to unintentional accidents for the years 2011 through 2015?

      ____

   c) What was the 2011-2015 YPLL rate from unintentional accidents for St. Louis County?

      ____

   d) The 2011-2015 Missouri YPLL rate from unintentional accidents was 1,308 per 100,000 population. Was there a statistically significant difference between the rates for St. Louis County and the State of Missouri?

      ____

      ____

   e) If you were writing a report about these YPLL rates, how would you choose to present your findings?

      ____

      ____

      ____

      ____

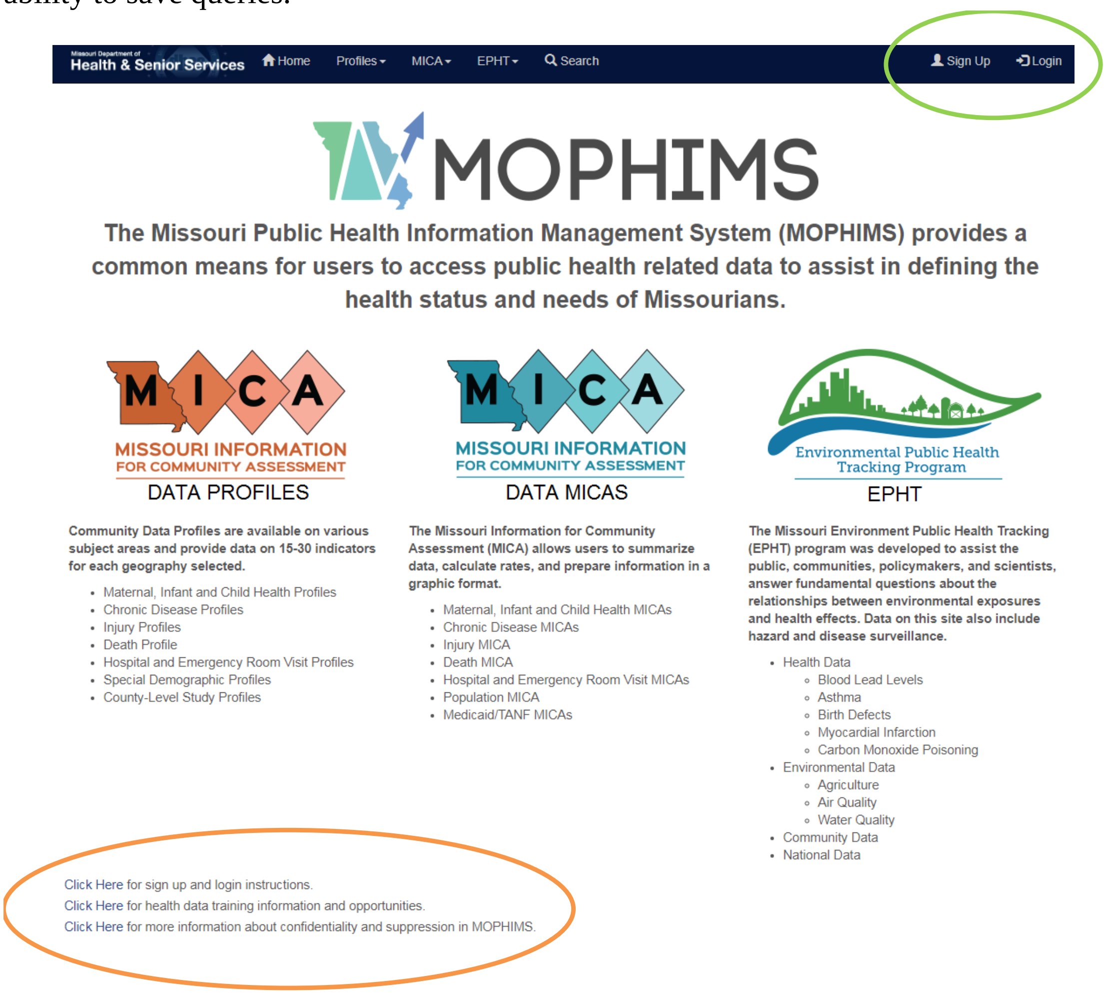
      ____

MOPHIMS: Enhanced MICA Features

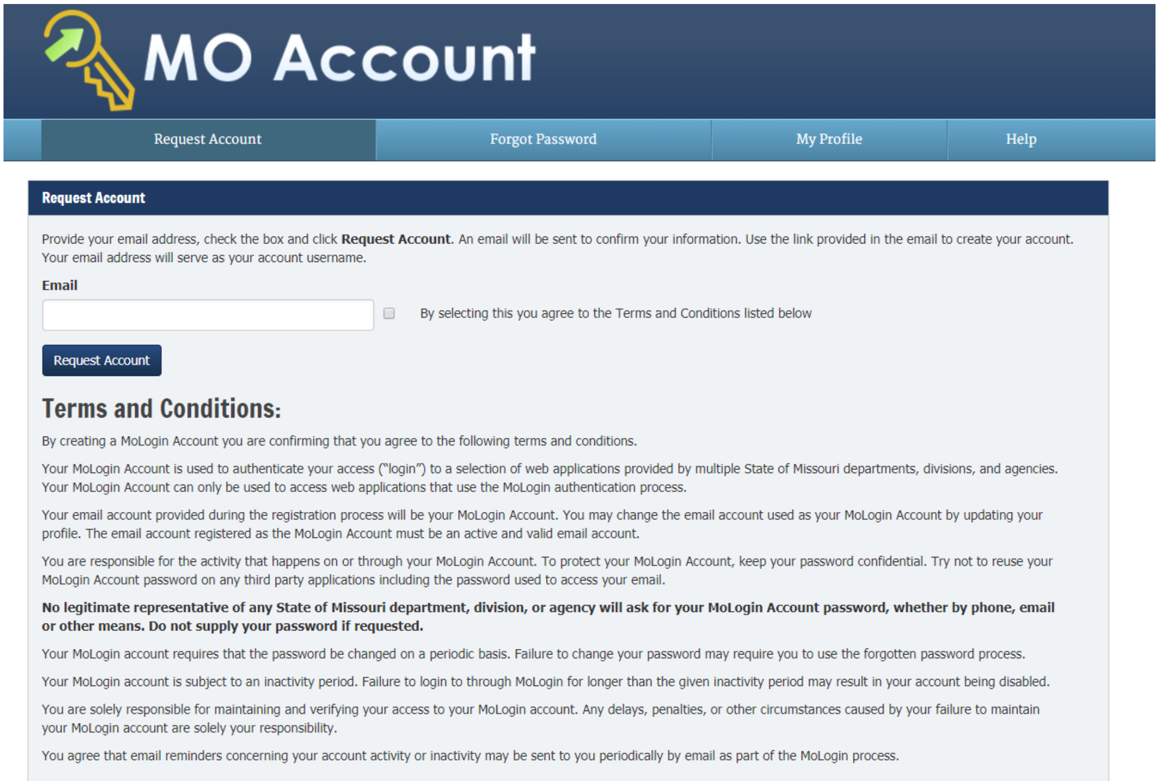
MOPHIMS User Levels

While MOPHIMS has many exciting new features, the most prominent is the introduction of different user levels within the Data MICAs and EPHT. Users can now choose to sign up to become a Registered user (at no cost). As shown in the screen capture below, the orange circle in the bottom left corner on the MOPHIMS home page directs users to a link where they can access instructions on how to register. The green circle at the top of the webpage shows the location of the **Sign Up** and **Login** buttons.

Registered users will have access to enhanced features and pieces of data not available to Public users. Some of these features include the ability to create 2x2 tables, enhanced maps and charts, to examine more granular geographic death and seasonal data, and the ability to save queries.



Users that have not yet taken the time to become a Registered MOPHIMS user are encouraged to do so. The MO Account and MO Login screens for signing up and logging in for MOPHIMS are shown on the following page.

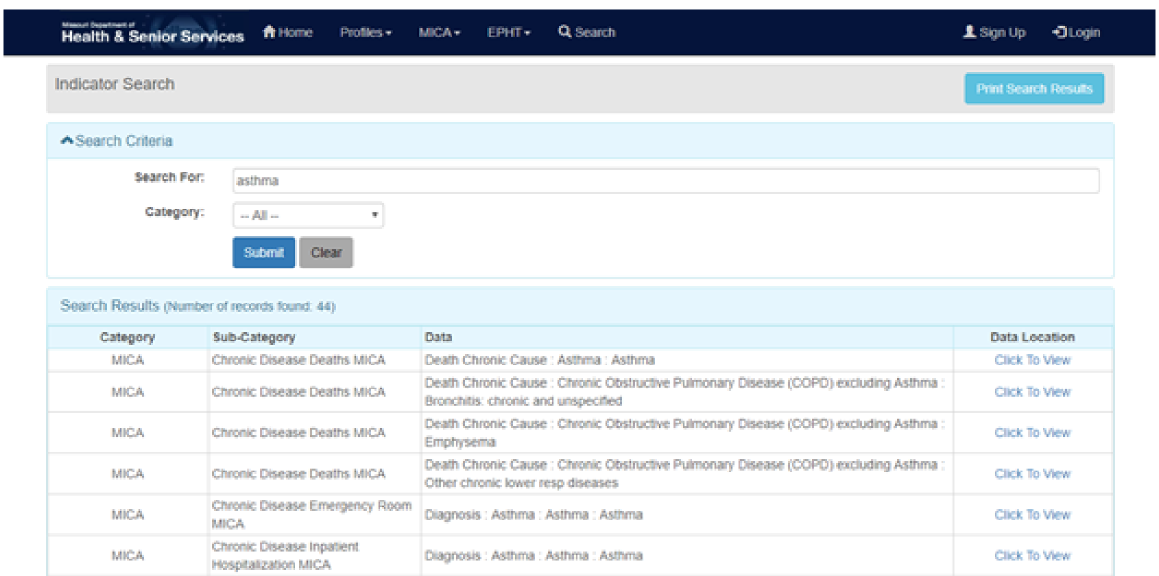


Or, if already registered, users can go ahead and log in.

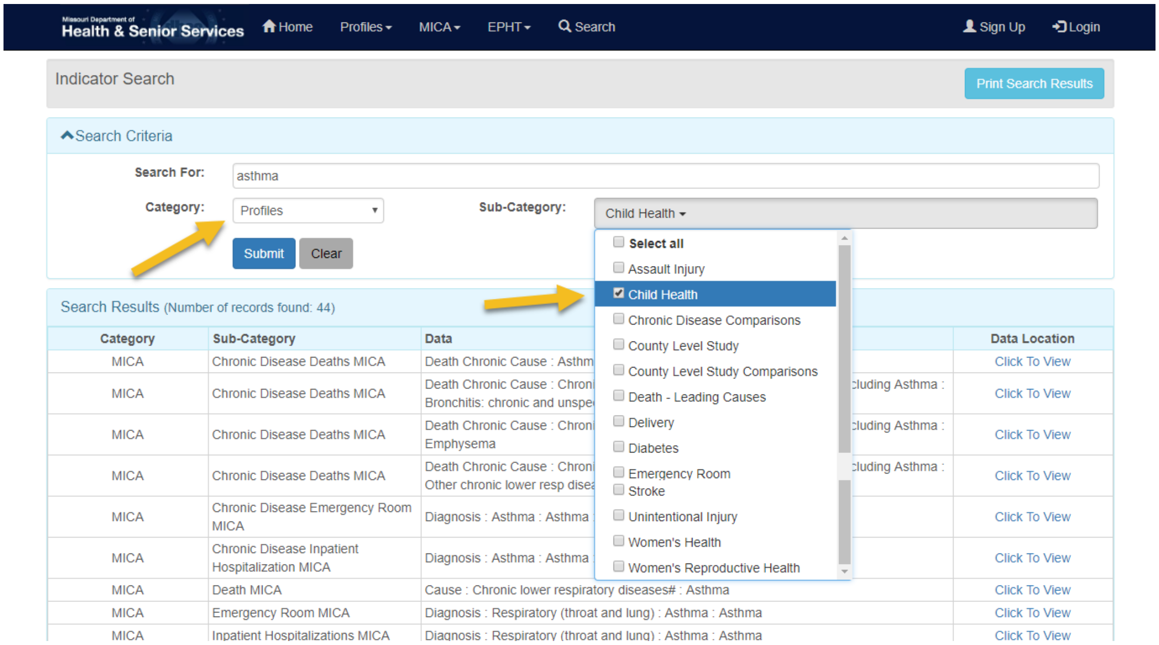
MOPHIMS Search Function

The MOPHIMS Search Function is a result of efforts to help users find the information they are seeking more efficiently. MOPHIMS contains hundreds of different data indicators, and even our most experienced users struggle to quickly find the data they seek.

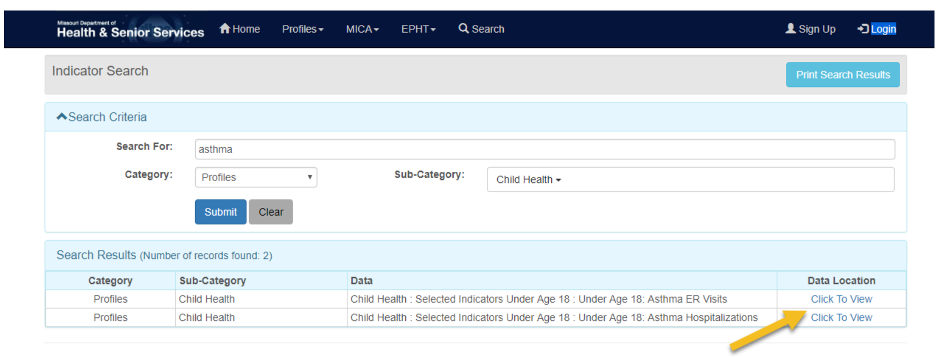
Clicking ‘Search’, which appears on the top banner of every MOPHIMS page, will take users to the Search Indicator page. Suppose a user was interested in researching how asthma was affecting residents in their community. When entering ‘asthma’ in the search box and hitting submit, the following results are displayed.



Users will see a table that lists all available asthma-related data in the MOPHIMS system. In order to narrow the results, users can choose which category, or data system, to parse the data (Profiles, MICA, or EPHT) and then which specific sub-category to search. Making the following selections will drill down to Profiles which contain asthma indicators, then specifically the Child Health Profile.



The two resulting entries, Under Age 18: Asthma ER Visits and Asthma Hospitalizations can be viewed on the Child Health Profile simply by clicking the 'Click to View' hyperlink in the rightmost column of the search table.



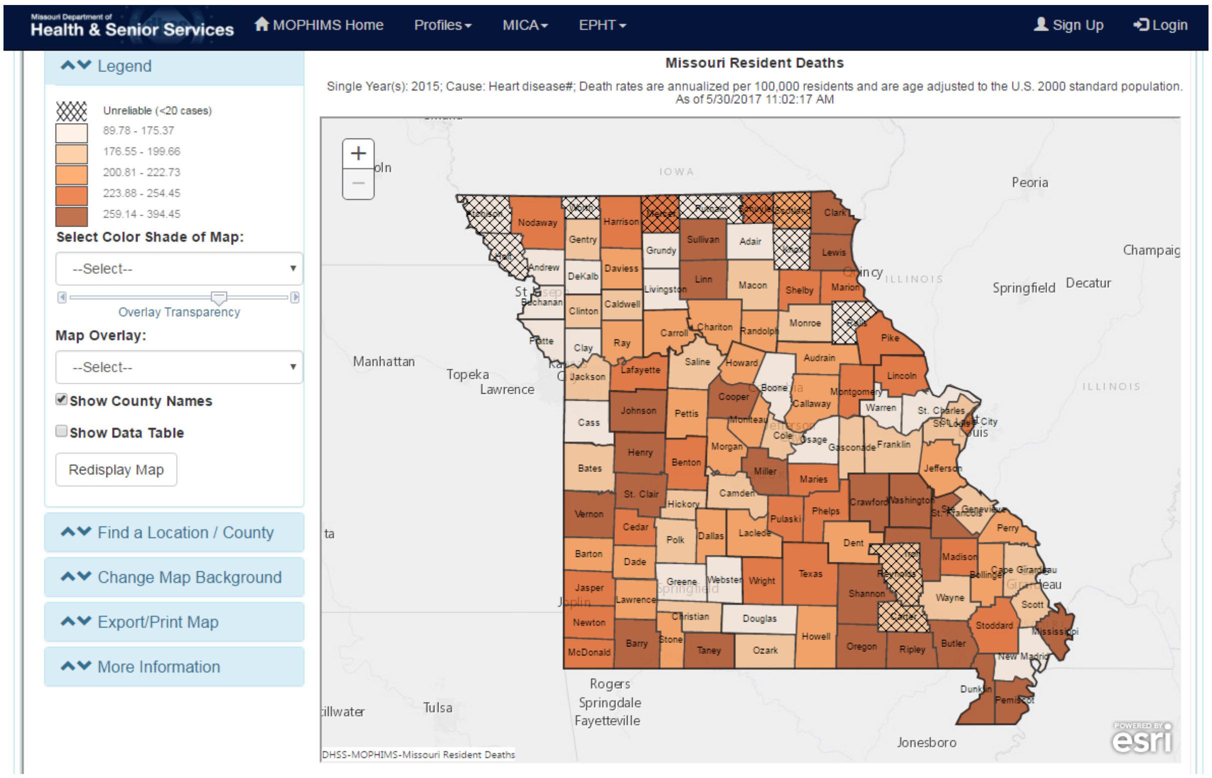
Mapping/Charting

The new MICA system provides enhanced mapping features and introduces charting options for the first time. The **Build Your Results** section defaults to a tab for creation of a data table, but users may also choose to **Make a Map** or **Create a Chart**. Users should make selections for querying in the **Choose Your Data** section of the page and then select the mapping or charting tab in the **Build Your Results** section.

Mapping

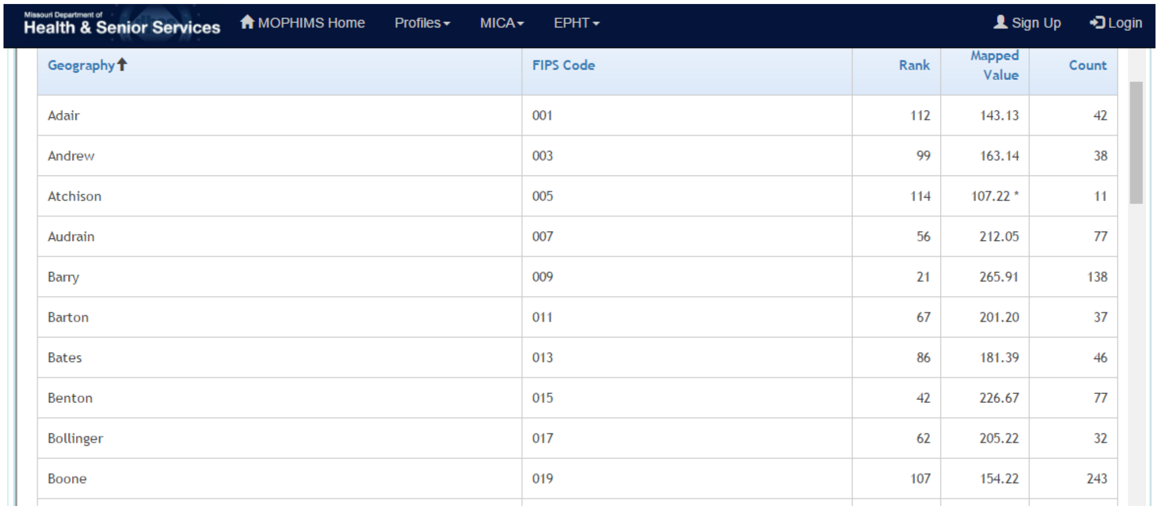
Three types of maps are available: quartile maps, quintile maps, and statistical significance maps (Higher/Lower than State). Quartile and quintile maps can be used to compare either rates or counts, while statistical significance maps show rates only.

The quintile map below, created in **Death MICA**, shows Missouri resident deaths in 2015 due to heart disease. Higher rates are represented by darker colors. Users can see a cluster of counties in the Southeast Region of the state with rates that are in the highest quintile. Users may also notice that some Northern counties are overlaid with a crosshatch. This means that the rates are unreliable (based on counts of less than 20). The map can be exported as either a PDF or JPG by clicking the **Export/Print Map** button on the left side of the map.



Users also have the ability to show the data table used to generate maps. By simply checking the box next to **Show Data Table** on the left side of the map, the information will display below the map. Included in this data table are the FIPS codes for each county, the county's rank statewide (out of 115 counties), the mapped value (in this case the rate), and the count.

The data table can be exported as a CSV file for use in Excel or GIS mapping software.

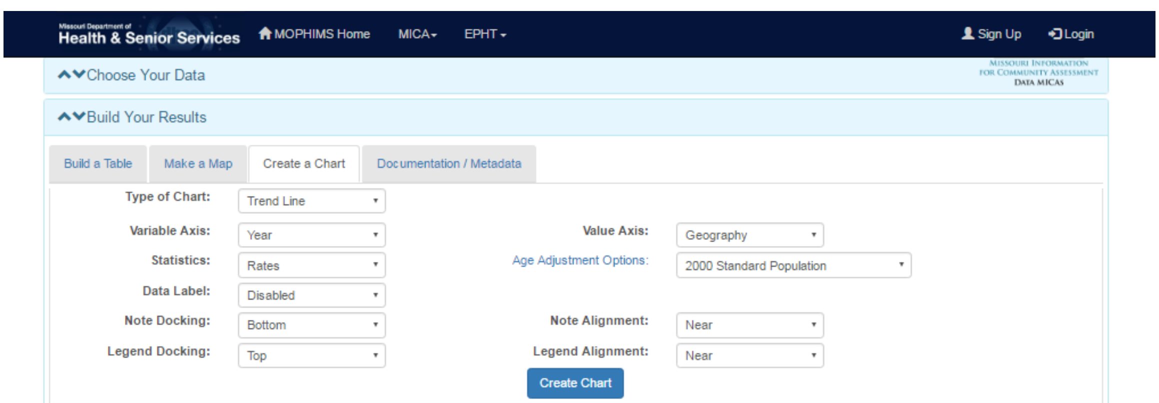


Geography	FIPS Code	Rank	Mapped Value	Count
Adair	001	112	143.13	42
Andrew	003	99	163.14	38
Atchison	005	114	107.22 *	11
Audrain	007	56	212.05	77
Barry	009	21	265.91	138
Barton	011	67	201.20	37
Bates	013	86	181.39	46
Benton	015	42	226.67	77
Bollinger	017	62	205.22	32
Boone	019	107	154.22	243

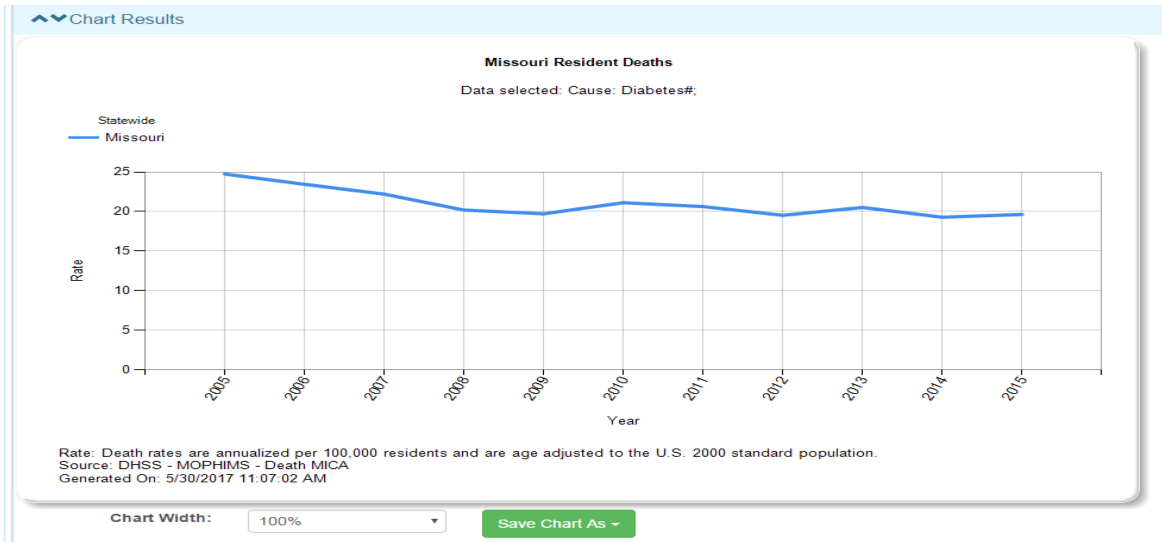
Trend Lines/Line Charts

The ability to create charts and graphs is now available through MICA. Users can now create and export line, bar and pie charts. This section of the handbook will focus on how to generate graphics in MOPHIMS. A later section will more broadly address best practices when visually displaying data.

Suppose a user was interested in comparing death rates due to diabetes over time. The user would need to select the appropriate data in the **Choose Your Data** section and then click on the **Create a Chart** tab under **Build Your Data**, as shown on page 36. Next they would select Trend Line as the **Type of Chart**. Other available chart types include Vertical Bar, Horizontal Bar, and Pie charts. Finally, users should select **Year** on the variable axis to custom-create a chart showing the data of interest.



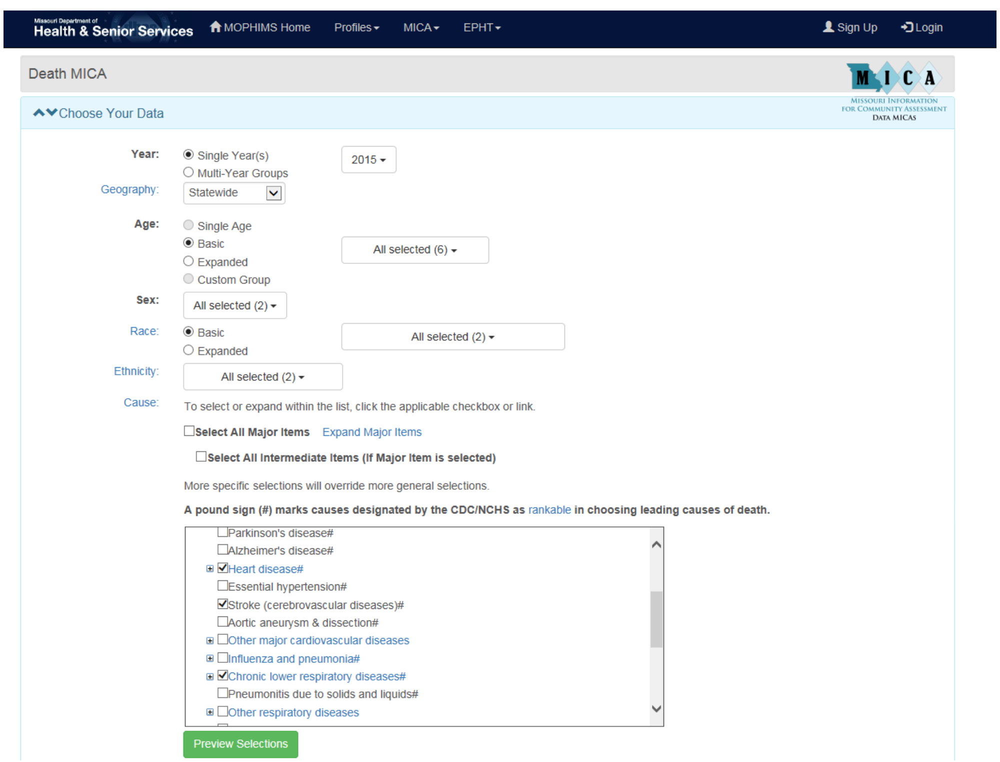
Other selections related to the formatting of the graphic may also be selected in the **Create a Chart** tab. Users may experiment with the docking, alignment and data label options to create a chart that is visually appealing or simply easy to read.



Much like maps, both the underlying data table and the chart itself can be exported and saved to external sources. Charts can be saved as PDF, JPEG, or PNG images.

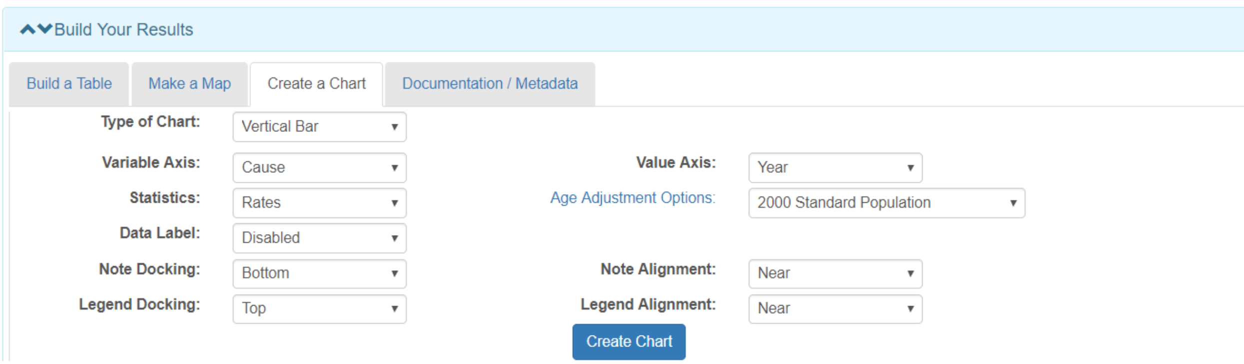
Bar Charts

For the next example, suppose that an analyst wanted to create a bar chart with the five leading causes of death for the most recent data year. Prior research indicates those categories are: Cancer, Heart Disease, Chronic Lower Respiratory Diseases, Accidents, and Stroke. From the **Choose Your Data** screen, the analyst would need to select those five categories.

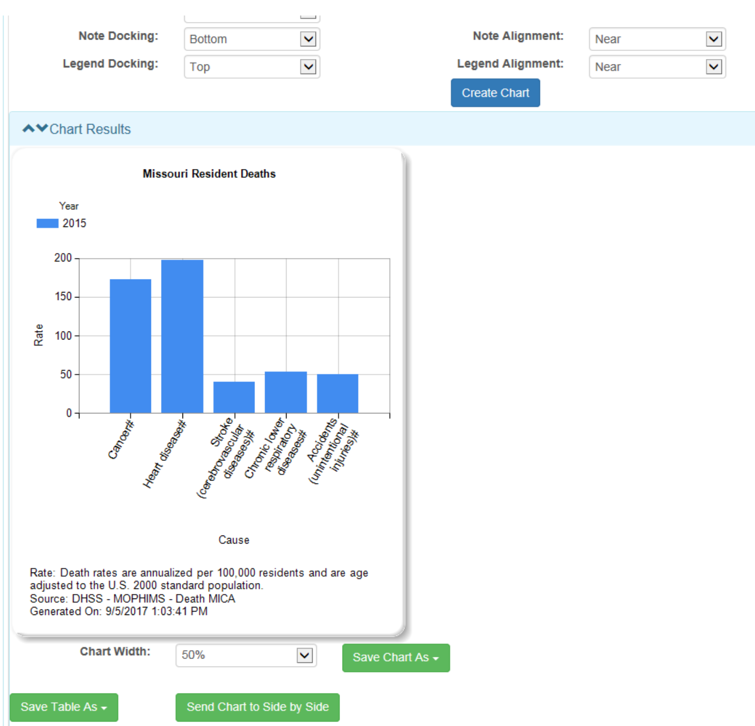


After making those selections, the analyst will scroll down to the **Build Your Results** portion of the page and select Vertical Bar as the type of chart. Likewise, users could select the Horizontal Bar Chart if there are a large number of variables or the label names are particularly long.

Once Vertical Bar is selected, the page will refresh to give users customized options for this particular type of chart. At this point, the analyst should select Cause from the list of **Variable Axis** options. Since the analyst is only looking at one year of data, the default **Value Axis** may remain Year. If a multi-year graph was being developed (which would likely be necessary at the county level for deaths), users would want to change the **Value Axis** to Statistic for this example.



The analyst should now select the 'Create Chart' option at the bottom of this portion of the page to view their new bar graph. The resulting chart is displayed next.

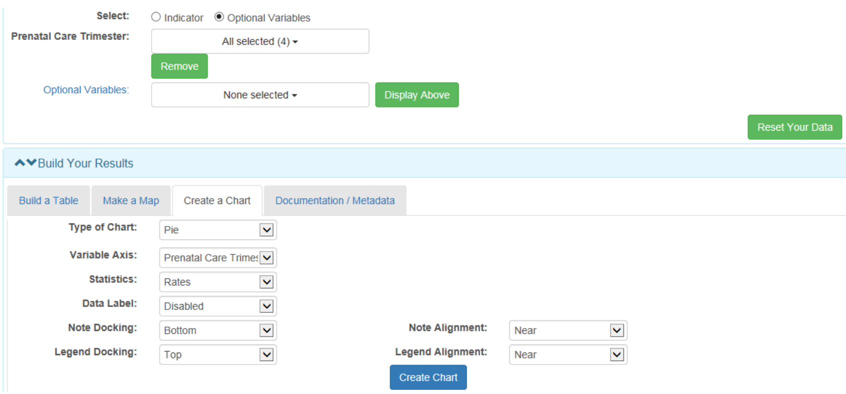


Additional features on the **Chart Results** page allow users to adjust the chart width for easier viewing, save the chart as an image or save the data table that the chart is based upon.

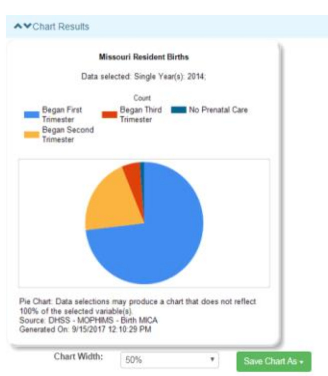
Pie Charts

Users also have the option of creating pie charts. However, this option is not appropriate for all types of data. *Pie charts only graph based on the count and never the rate.* As a general guide, pie charts should only be used when 100% of the total possible events are included in the pie chart. However, the query tool cannot always tell when a graphic is appropriate or not, so the user must use discretion on whether a graphic appropriately reflects the data.

The following example shows a pie chart generated in **Birth MICA**. Here an analyst selected from the list of **Optional Variables** the Prenatal Care Trimester. Then under the **Create a Chart** tab they selected Pie as the **Type of Chart** and Prenatal Care Trimester as the **Variable Axis**. All other defaults were left unchanged.

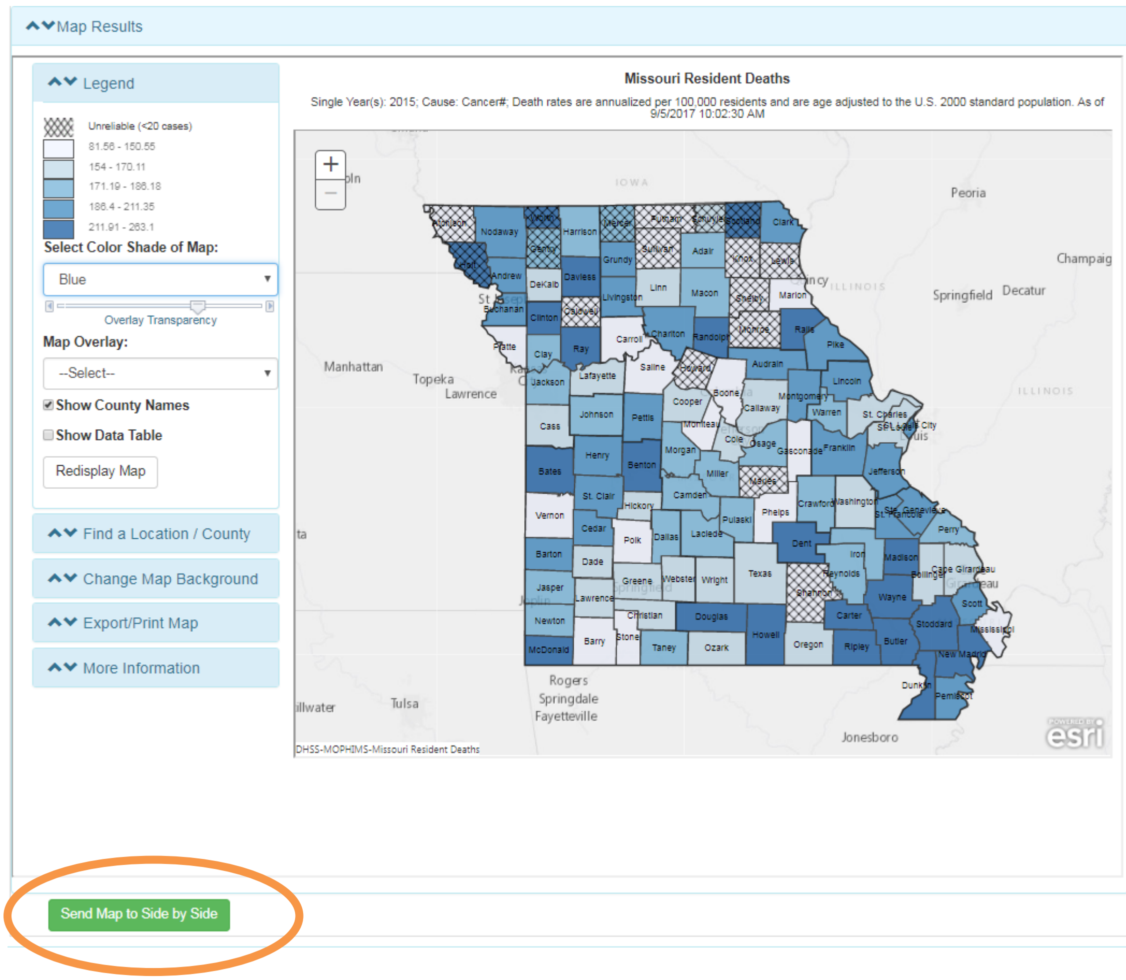


After clicking on the 'Create Chart' button, the following graphic is displayed. Users can see that not quite 3 in 4 women statewide receive prenatal care beginning in the first trimester. An additional 20% receive care beginning in the second trimester, with the remaining women either getting care starting in the third trimester or receiving no prenatal care at all.

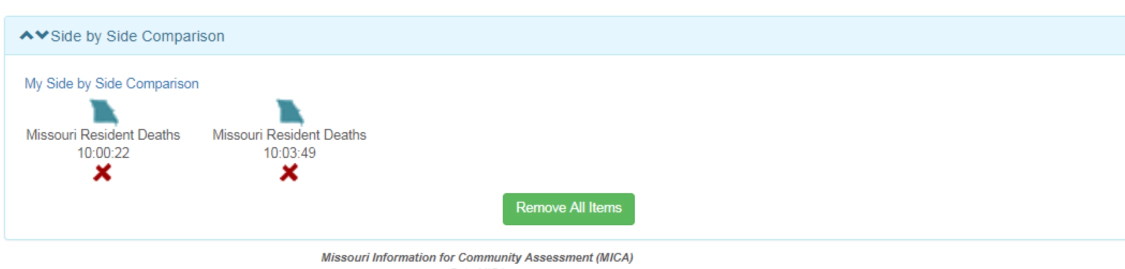


Side-by-Side

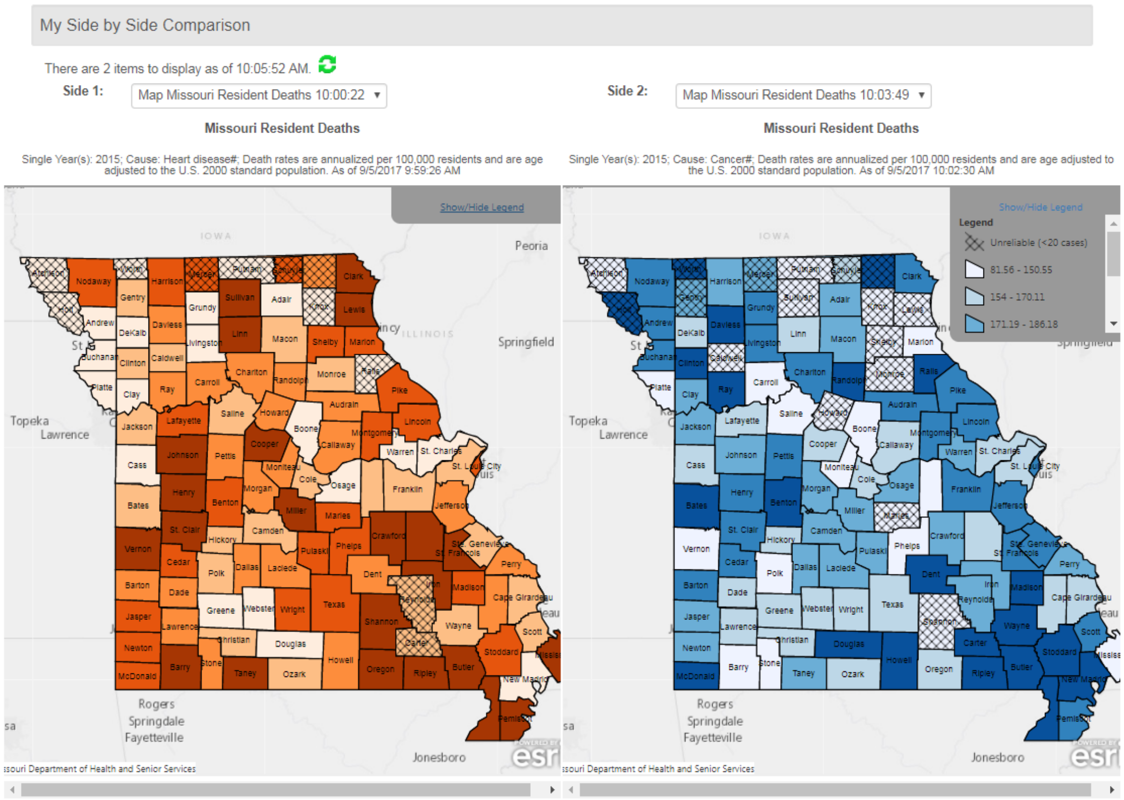
The new Side-by-Side feature allows users to compare any of the tables, charts, or graphs created in MICA on a single screen. For example this feature could be used if an analyst wanted to compare the heart disease death quintile map shown on page 34 to a quintile map showing deaths due to cancer. The user would create both maps and then click ‘Send Map to Side by Side’.



Both maps then show up in the Side by Side Comparison tray at the very bottom of the webpage. Clicking the ‘My Side by Side Comparison’ hyperlink will take users to a new webpage where they can choose which visualizations to display.



Right now the tray has only two items, so choosing which to display is simple. Each table or graphic is timestamped when it was created in MOPHIMS.



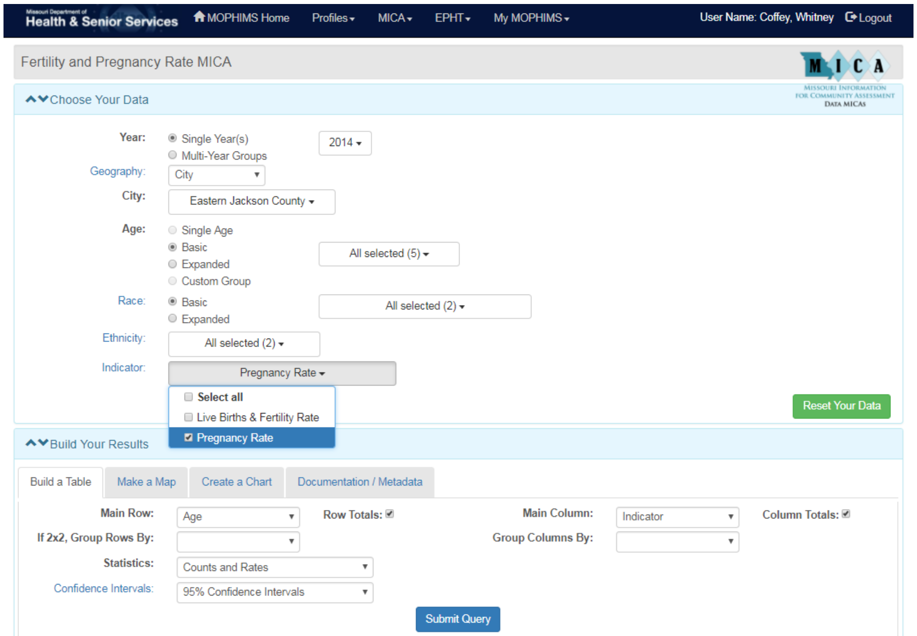
The legend for each map can be expanded or collapsed depending on user preference. Other customizations, including map colors, county labels, etc. must be made on the previous **Map Results** section of MICA.

With a few clicks, users can easily make visual comparisons using the MOPHIMS tool. For instance, Wayne and Madison Counties (in Southwest Missouri) might be interested in doing research geared to forming a cancer screening coalition, as they have some of the highest cancer death rates in the state. Neighboring counties Butler, Ripley, Oregon, and Shannon, however, might consider partnering to do outreach related to heart disease prevention, to address the high rates of heart disease deaths in their counties. While those coalitions might pool resources for other endeavors, a simple comparison map shows that their areas of focus (between heart disease and cancer) might differ slightly.

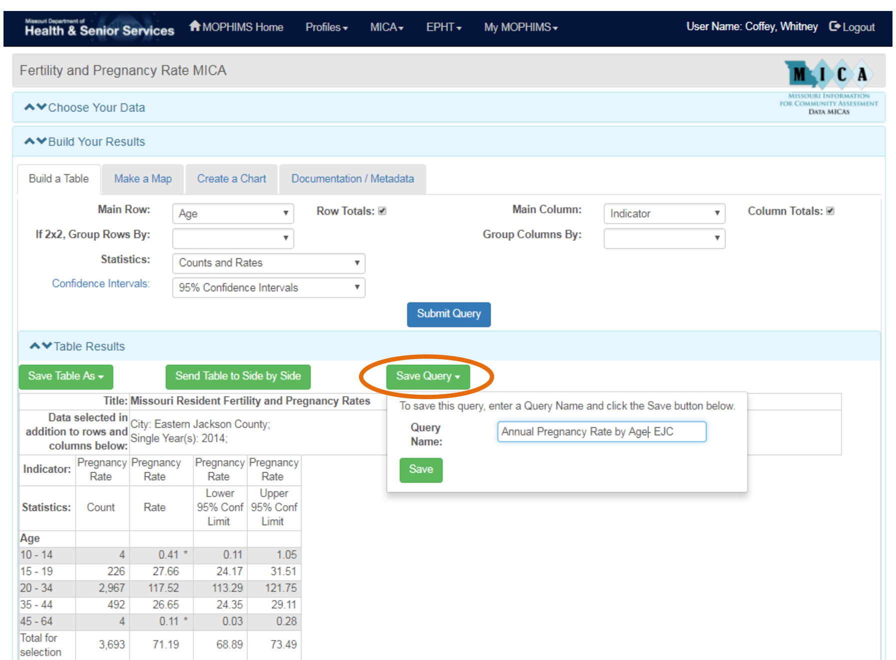
Save Query

Registered users now have the option to save queries for future use. This feature is extremely useful when a user will be running similar queries, but frequently need to change just a few variables. For example, many local public health departments create an annual Community Needs Assessment, which will require similar statistics to be updated annually. Instead of starting from scratch, those creating these reports will be able to easily access the query saved the previous year, adjust the **Year** inputs, and output the same results while using the older query as a template.

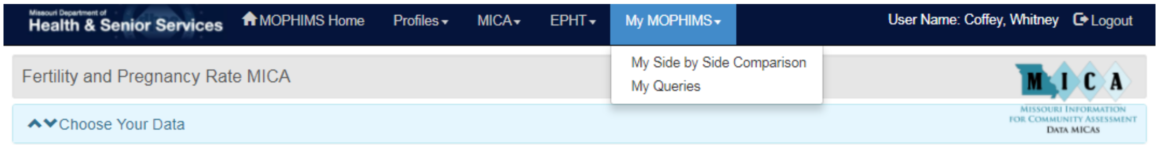
Say, for example, an analyst in Eastern Jackson County needed to know the annual pregnancy rate by age for their geography. They would simply set up the query in **Fertility and Pregnancy Rate MICA**.



After submitting the query and generating a data table, the analyst would then click ‘Save Query’, name it appropriately, and click ‘Save’.

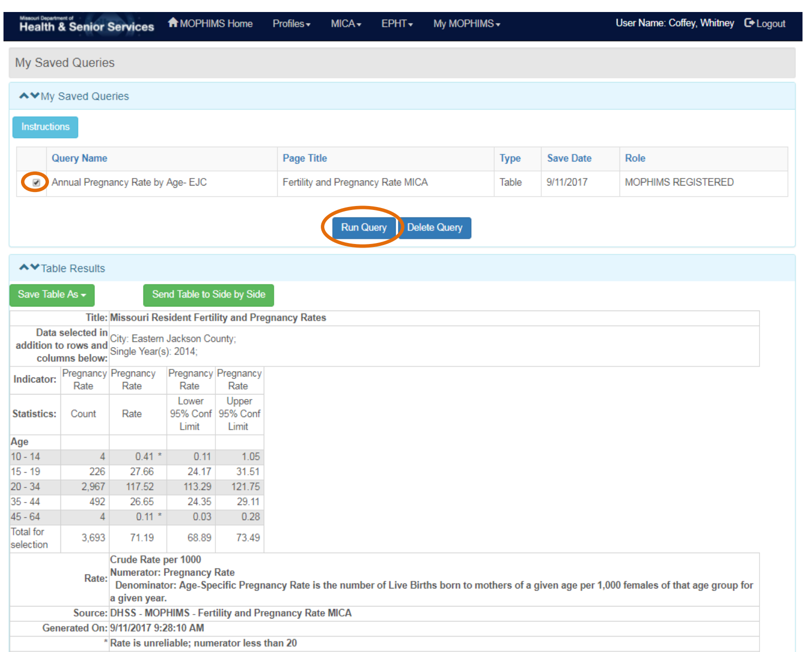


To view saved queries, users can click on the ‘My MOPHIMS’ dropdown in the header and choose ‘My Queries’.



As in the screen capture that follows, the user will see the named query, the MICA in which the query was generated, the type of output (table, map, chart), and the date on which the query was saved. If the user has more than one user level, that will also be displayed.

In order to re-generate the results from the saved query, users simply check the box beside the query and click ‘Run Query’ (shown below). Users can save up to 20 queries. Deleting queries follows a similar procedure. Just click the box and choose ‘Delete Query’.



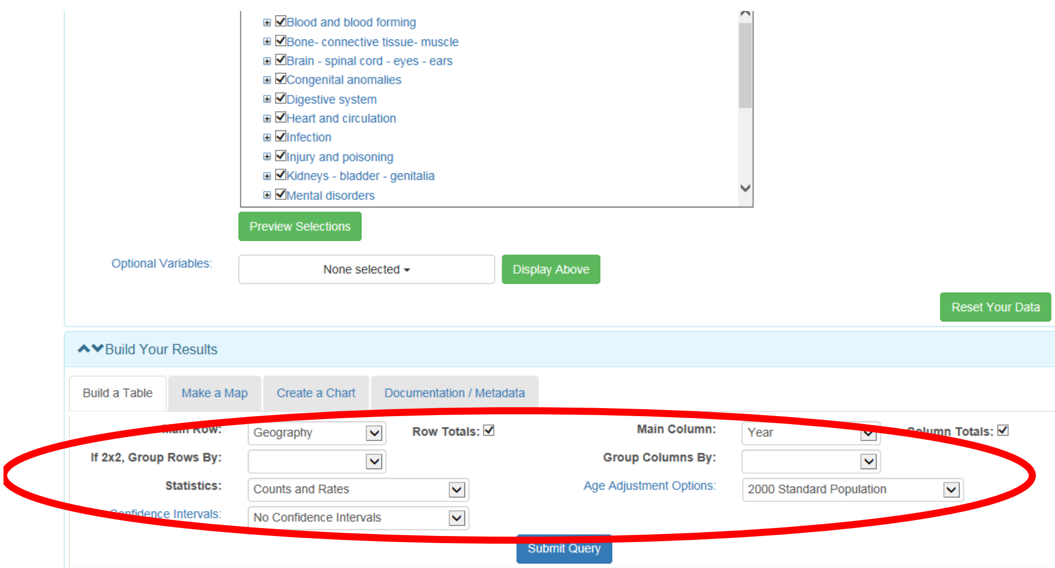
At this time, users cannot change input selections inside the **My MOPHIMS** or **My Saved Queries** tool. For instance, if a user interested in Eastern Jackson County user wanted to run the Annual Pregnancy Rate by Age query using 2015 data when it became available, the user would have to go back to the **Fertility and Pregnancy MICA** to do so. However, this tool is a great way to ensure that the same query, using the same inputs, is being run each time a user needs to update data.

2 x 2 Tables

For Registered users, several additional enhancements are available. In the past, one of the most frequently requested features was the ability to create 2x2 tables. In MOPHIMS, the new 2x2 feature allows users to choose up to four variables to view in a data table.

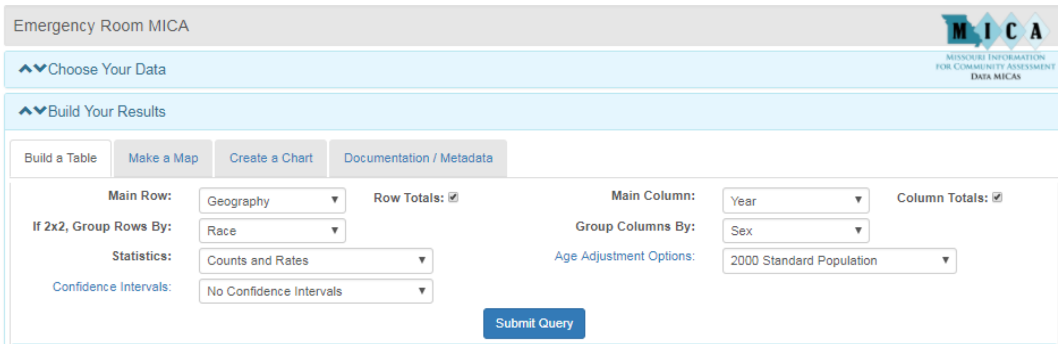
For this example, an analyst uses **Emergency Room MICA** to look at ER visits for Jackson County and St. Louis County by race and sex for the years 2004 and 2014. In the past, this kind of complex table could only be generated by creating multiple MICA tables and then exporting them into Excel and merging the tables manually. In the new MICA, all the information can be generated in one table!

For the most part, the query screen for Registered users looks the same as for Basic users. One significant exception is found in the **Build Your Results** section of the page. An extra row is added with the label '**If 2x2 Group Rows by'** and **'Group columns by'**. These are optional selections and the table will still generate if these are left blank.



However, in this case, the analyst wants to make selections to generate a complex table by geography/year/race/sex. For most MICA query selections, these variables can be selected in any combination and will not greatly impact the results. The order selection in these cases is more about what the user wishes to emphasize and the focus of the table; the output numbers/rates will be the same, just placed in different cells in the table. In most situations, having the variable of most interest as the **Main Row** and/or **Main Column** will make for the best selection.

In this example, the analyst can leave Geography and Year as the **Main Row/Column** and then add Race/Sex as the **2x2 Secondary Row/Column** as shown below.



After clicking the blue 'Submit Query' box at the bottom of the window, the following table is generated. While the table can seem overwhelming at first, upon further analysis the table becomes easier to read as comparisons may be made across various demographic groups. With a bit of study, users can see that ER visits for Black Females increased the most during the past 10 years for both Jackson County and St. Louis County. Likewise, Black Males and White Females saw very large increases. However, White Males in both geographies (and in the state overall) actually saw declines.

Title: Missouri Resident Emergency Room Visits

Data selected in addition to rows and columns below: None

	Year:	2004	2004	2004	2004	2014	2014	2014	2014	Total for selection	Total for selection	Total for selection	Total for selection
	Sex:	Male	Male	Female	Female	Male	Male	Female	Female	Male	Male	Female	Female
	Statistics:	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
County	**Race**												
Jackson	White	66,045	282.74	82,450	341.59	66,503	278.68	91,526	374.30	132,548	280.96	173,976	357.63
Jackson	Black or African-American	39,059	520.85	50,470	571.54	53,713	677.61	77,060	846.29	92,772	601.72	127,530	709.63
St. Louis County	White	65,212	185.03	75,440	196.46	56,900	169.98	73,975	205.14	122,112	178.09	149,415	200.51
St. Louis County	Black or African-American	42,722	421.47	61,073	505.01	61,180	545.10	92,186	681.30	103,902	486.56	153,259	597.16
Total for selection	White	131,257	224.14	157,890	253.88	123,403	215.82	165,501	276.13	254,660	220.29	323,391	264.40
Total for selection	Black or African-American	81,781	464.40	111,543	531.80	114,893	601.13	169,246	746.10	196,674	535.68	280,789	642.06
Missouri	White	695,520	291.97	867,867	352.62	696,359	282.26	929,762	369.55	1,391,879	287.34	1,797,629	361.01
Missouri	Black or African-American	152,350	456.15	202,109	549.09	202,674	551.75	280,317	705.06	355,024	506.90	482,426	629.95

Rate: Emergency room visit rates are annualized per 1,000 residents and are age adjusted to the U.S. 2000 standard population.

Source: DHSS - MOPHIMS - Emergency Room MICA

Generated On: 9/5/2017 4:52:36 PM

MOPHIMS: Enhanced MICA Features Exercises

1. The Farmers' Almanac is predicting yet another steamy summer. As an administrator at the Greene County Health Department, you want to publish informational pamphlets for your community. You decide to dig through **Injury MICA** for statistics pertaining to overexertion (Hint 1: It is a category under Mechanism). You also want to look at 5 years of aggregated data (2010-2014) to see what age and gender groups have experienced the highest rates of discharge for residents of Greene County. (Hint 2: Set up a 2x1 table using Age and Sex as your **Main Row/Column** and Patient Type as your secondary variable.

    a) Regardless of sex, what age group visited the emergency room the most in Greene County? ____

    b) What was the count and rate for females aged 25-44 in Green County who visited the ER? ____

    c) Write a statement describing the differences between ER and Inpatient data for overexertion injuries for all Greene County residents regardless of age or sex:

    ____

    ____

    ____

2. As a concerned citizen who lives along a winding highway in rural Missouri, you are curious how deaths due to motor vehicle accidents have changed over the last ten years. You decide to use **Death MICA** to compare rates for the 2005-2015 time period.

    a) Generate a statistical significance map for deaths due to motor vehicle accidents for 2005-2015. Please describe the patterns you find.

    ____

    ____

    ____

    b) Create a trend line chart using Year as the **Variable Axis**. What year had the highest rate? ________________ The lowest rate? ____________________

    c) How would you describe the chart trend?

    ____

Clear Communication

Communication Overview

When preparing any type of report or presentation, clear communication is essential. This section focuses on communicating data through community health assessments. Community health assessments serve a variety of purposes, some of which involve persuading others to take a certain course of action. For example, a community health assessment can be used to "advocate for more resources" or "inform policy and program development."[15] Furthermore, assessment is one of the core public health functions. However, most of the recommendations presented in this course are applicable to any form of communication, including grants, newsletters, pamphlets, press releases, and presentations, among others. Whatever form is used, these clear communication strategies will make it easier for the intended message to reach the appropriate audience.

The audience must be the first consideration when preparing a community health assessment. Although a written report may be required by the Department of Health and Senior Services, the information contained in the assessment is also intended to be used internally by local public health agencies as well as by community organizations, decision makers, and local residents. This information may need to be presented differently to each of these separate groups. For example, a presentation to the general public should not include as many technical terms or advanced statistics as a presentation to medical practitioners or researchers.

Data presentation also depends on the type of data to be presented. Data can generally be described as either quantitative or qualitative. Quantitative data involve measurements, or numbers, whereas qualitative data involve non-numerical descriptions. Both types of data are important. For example, when studying diabetes in a community, an analyst might first want to use the Community Data Profiles or MICA to find numerical, or quantitative, data about diabetes. These data could include death, hospitalization, and ER visit rates related to diabetes. Quantitative data could also include data from other sources, such as the number of physicians who specialize in diabetes treatment.

However, the analyst would also want to consider qualitative data. These data could be gathered by interviewing diabetes patients to evaluate their treatment experiences or collect their suggestions for ways to improve diabetes education and prevention methods. Most of the examples in this course will deal with quantitative data, but qualitative data can be equally important. While quantitative data can help an analyst understand the extent of a problem, qualitative data are often necessary for understanding the reasons a problem exists and for finding ways to address the issue.

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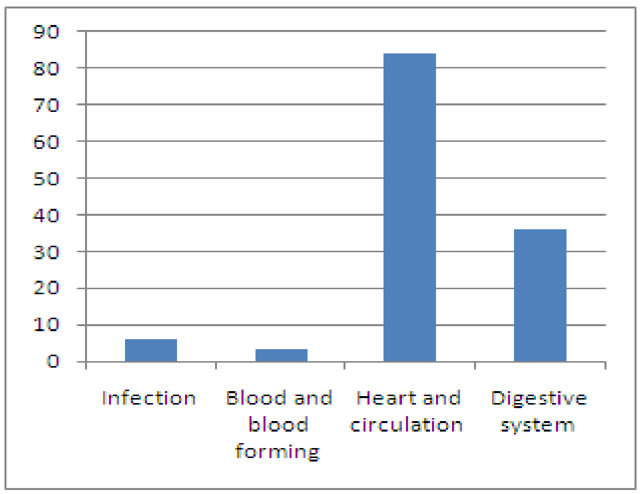
[15] Ballard J. *Basic concepts of data analysis for community health assessment: Analysis and interpretation of public health data, part I* [Online presentation]. Northwest Center for Public Health Practice; 2009. http://www.nwcphp.org/training/opportunities/online-courses/part-2-basic-concepts-in-data-analysis-for-community-health-assessment. Accessed October 27, 2017.

Context

Both types of data require that context be provided so readers can fully understand the information. Otherwise, readers will be confused about the author's message. Consider the following examples:

Infection	6
Blood and blood forming	3
Heart and circulation	84
Digestive system	36



A reader can determine that the data in both the table and the chart are quantitative and relate to some type of health issue. Beyond that, readers have no idea what type of information the author is trying to convey. What do these data mean?

- Do these data represent causes of death, hospitalizations, emergency room visits, incidence, prevalence, or some other health issue?
- Do the numbers represent actual cases or some type of rate?
- What geographic area do the data cover?
- What time period is covered?
- Where did the author obtain this information?

Likewise, the following sentence, although it is a bit more specific, omits some critical information.

The rate of death from Alzheimer's disease is 21.2.

Although this sentence states that the number reported is a rate, it does not answer the following questions:

- What geographic area and time period does this rate cover?
- What is the constant for the rate – does the rate represent 21.2 deaths per 100 residents, per 1,000 residents, per 100,000 residents?
- Is the rate age-adjusted?

In addition to providing basic descriptive information, analysts must place data in the context of other data. For example, knowledge of Missouri's premature birth rate is only useful if that rate can be compared to the national rate, rates from other states, or rates for other conditions. Context can even require an understanding of data limitations. For instance, in the 2004-2008 time period, diabetes was listed as the underlying, or primary, cause of death for 7,273 persons in Missouri. It was listed as a contributing, or secondary, factor for 24,940 additional deaths. However, death data, such as those contained in the **Death MICA**, usually represent only the underlying, or primary, cause of death. Thus, statistics on deaths alone will not accurately reflect the extent (or prevalence) of a health condition. Data from a variety of other sources, such as hospitalization and emergency room records and surveys like the BRFSS (Behavioral Risk Factor Surveillance System), are needed in order to determine the full impact of a health condition in a community.

Without this contextual information, data are essentially meaningless. Readers cannot draw accurate conclusions or compare the data to data from other areas unless appropriate context is provided.

NOTE: The earlier table and chart use 2007 data for Clark County. These data were obtained from the **Inpatient Hospitalization MICA**. The numbers represent rates per 10,000 population. The page's narrative is fictional.

Data Presentation

Data, particularly quantitative data, can be presented in several different formats. These formats include tables, charts, maps, and narrative. Each of these formats has strengths and weaknesses. When selecting the most appropriate format to use, an author must consider the needs of the audience as well as the message to be conveyed. Throughout this section, data from the MICA system will be used to illustrate the different presentation formats. Note that much of this data has been exported from MOPHIMS and customized in Excel.

Tables – Much of the information available in the Profiles and MICAs is presented in tabular form. Tables are useful for showing large amounts of numerical data "when precise values are needed."[16] For example, if the purpose is to provide the exact number of births for several different years and risk factor indicators, a table should be used. However, especially with large tables such as this one from **Birth MICA**, isolating patterns can be difficult.

Missouri Resident Births

Indicator:	Birth Spacing: Less Than 18 Months	Birth Spacing: Less Than 18 Months	Prenatal Care Adequacy (Missouri Index): Inadequate	Prenatal Care Adequacy (Missouri Index): Inadequate	Smoked During Pregnancy: Yes	Smoked During Pregnancy: Yes	Weight for Height: Mother Overweight 20% or More	Weight for Height: Mother Overweight 20% or More
Statistics:	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Year								
1990	6,303	13.76	13,750	17.76	19,540	24.81	16,709	22.04
1991	6,480	14.27	13,517	17.70	18,903	24.20	17,757	23.77
1992	6,188	14.00	12,494	16.88	17,725	23.42	18,272	25.35
1993	5,677	13.22	11,484	15.56	16,556	22.13	19,076	26.42
1994	4,921	12.02	9,646	13.43	15,111	20.71	19,463	27.66
1995	4,301	10.62	8,704	12.30	14,577	20.15	19,991	28.79
1996	4,413	10.67	8,517	11.92	14,409	19.66	21,416	30.44
1997	4,510	10.80	8,094	11.34	14,409	19.60	22,353	31.97
1998	4,476	10.51	8,041	10.92	14,309	19.09	23,644	32.82
1999	4,558	10.79	7,584	10.36	13,766	18.33	24,481	33.90
2000	4,657	10.77	7,596	10.31	13,955	18.34	25,735	35.19
2001	4,725	11.04	7,734	10.69	13,761	18.35	25,926	36.01
2002	4,566	10.72	7,705	10.69	13,607	18.19	26,417	36.89
2003	4,632	10.79	7,383	10.09	13,895	18.14	27,012	36.91
2004	4,877	11.24	7,490	10.08	14,083	18.21	28,155	38.22
2005	5,194	11.74	7,674	10.17	14,317	18.31	28,637	38.45
2006	5,497	12.10	8,201	10.61	14,946	18.44	29,832	38.96
2007	5,837	12.78	9,242	11.87	14,534	17.85	30,220	39.27
2008	5,742	12.75	9,150	11.90	14,212	17.63	30,334	39.91
2009	5,182	11.87	8,729	11.52	13,233	16.86	30,015	40.61
2010	5,258	12.64	11,895	16.83	14,335	18.86	30,280	40.24
2011	4,880	11.93	12,181	17.78	13,803	18.31	30,150	40.60
2012	4,922	11.92	12,507	18.39	13,507	18.05	30,427	41.10
2013	5,057	11.96	12,982	18.56	13,155	17.61	30,783	41.61
2014	5,203	12.06	14,204	20.16	12,454	16.71	31,212	42.11

[16] Miller, slide 8

Thus, the "zeal to convey all data in great detail needs to be tempered by the understanding that many readers have neither the interest nor the tolerance required to read and extract meaning from data presented in dense tables. Moving detailed tables to appendices or technical reports, for example, and keeping summary tables in the body of a report help to balance the competing demands for simplicity and detail."[17] The following example uses data from **Population MICA**.

Appendix Version:

Data selected in addition to rows and columns below:	None
Year:	2015
Statistics:	Count
Age	
Under 1	75,042
1 - 4	299,318
5 - 9	387,978
10 - 14	389,347
15 - 17	239,791
18 - 19	157,230
20 - 24	430,169
25 - 29	405,591
30 - 34	401,176
35 - 39	371,574
40 - 44	361,101
45 - 49	374,058
50 - 54	431,233
55 - 59	430,236
60 - 64	374,906
65 - 69	312,664
70 - 74	230,298
75 - 79	165,083
80 - 84	120,147
85 and Over	126,730
Total for selection	6,083,672

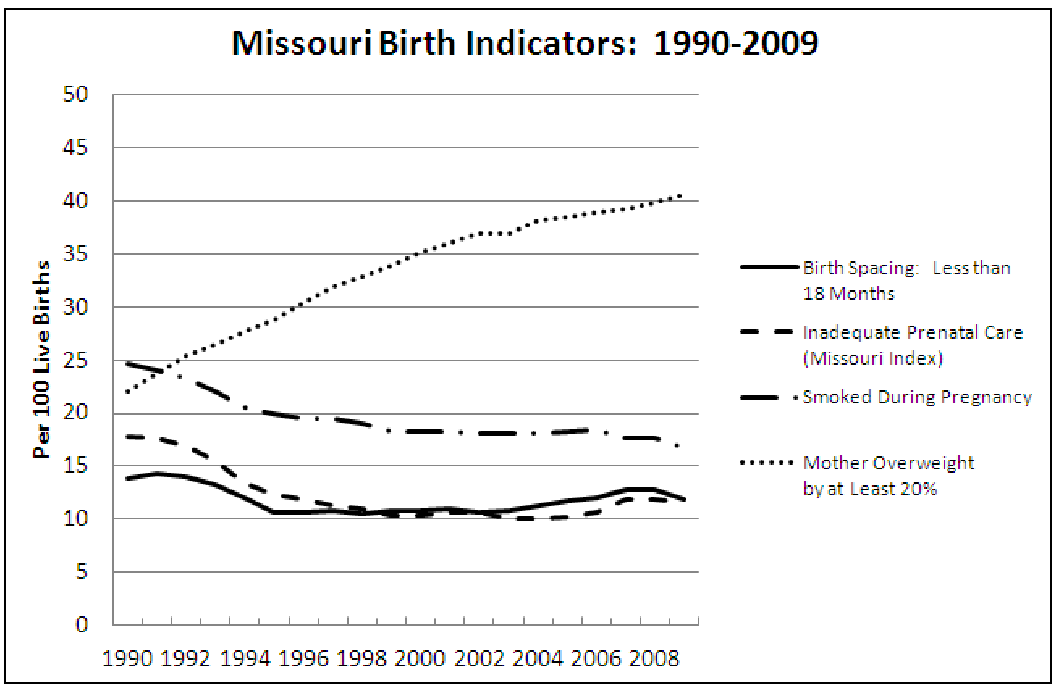
Main Document Version:

Title:	Missouri Resident Estimated Population
Data selected in addition to rows and columns below:	None
Year:	2015
Statistics:	Count
Age	
Under 15	1,151,685
15 - 24	827,190
25 - 44	1,539,442
45 - 64	1,610,433
65 and Over	954,922
Total for selection	6,083,672

[17] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.

Charts – Charts provide graphical representations of data. They can be used to illustrate patterns, although they may not always be able to present specific numbers. For example, if an author wanted readers to gain a general sense of which birth indicators are increasing or decreasing over time and how quickly those changes are occurring, they could present the data from the birth table in a line chart.

Line Charts – Line charts are "useful for showing a long series of data and for comparing several data series."[18] They can be used to illustrate the direction and acceleration of change over time. "No more than five to six lines should be contained on a single graph."[19] A different color or line style must be used for each line.[20] Include a legend so that readers know what each line represents. The major drawback to using a line chart is that readers may not be able to determine the exact number or rate portrayed. For example, in the following line chart, derived using data from **Birth MICA**, readers can see general trends but cannot determine the exact number of births impacted by each of the risk factors.



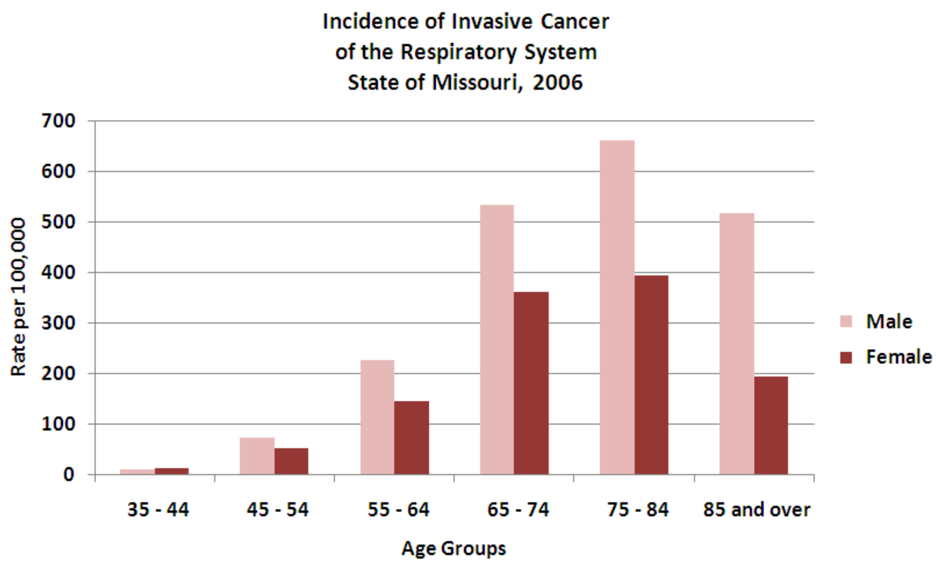
[18] Ballard J. *Basic concepts of data analysis for community health assessment: Presenting public health data* [Online presentation]. Northwest Center for Public Health Practice site; 2009. http://www.nwcphp.org/training/opportunities/online-courses/presenting-public-health-data. Accessed October 27, 2017.

[19] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.

[20] Ballard J. *Basic concepts of data analysis for community health assessment: Presenting public health data* [Online presentation]. Northwest Center for Public Health Practice site; 2009. http://www.nwcphp.org/training/opportunities/online-courses/presenting-public-health-data. Accessed October 27, 2017.

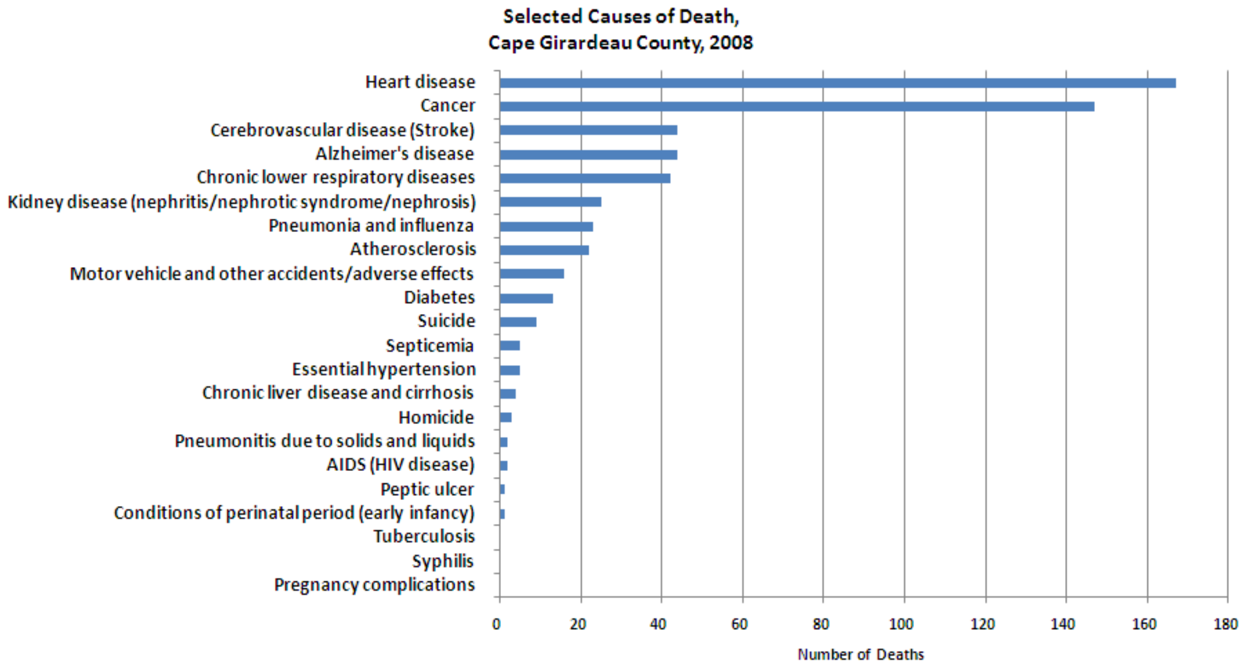
Bar Charts – Bar charts are "especially valuable for grouping multiple variables for easy comparison."[21] An important consideration when creating bar charts is to use colors or patterns that can be easily distinguished from one another.

Vertical bar charts are sometimes called column charts. "The audience naturally associates left-to-right with the movement of time, [so] vertical bars work better than horizontal bars for time series data."[22] This principle also applies to other ordered variables, such as the age categories from **Cancer Incidence MICA**.



[21] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.
[22] Strategic Communications. *Using charts*. https://web.archive.org/web/20130310125403/http://www.strategiccomm.com/usecharts.html. 1998. Accessed November 16, 2017.

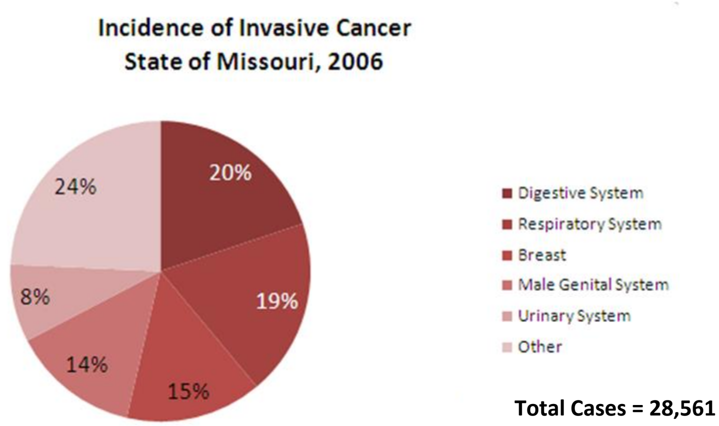
"The horizontal format is useful when . . . many categories [are shown] because there is more room for the category labels."[23] Horizontal bar charts should also be used if categories have long labels, as many of the Causes from **Death MICA** do.[24] They are most effective when "comparing items at one point in time," and for "[ranking] variables from largest to smallest."[25]



[23] Lane D. (Edited, Wang L.). *Graphing qualitative variables*. Rice University Openstax CNX. http://cnx.org/content/m10927/latest/. Last edited June 27, 2003. Accessed October 27, 2017.
[24] Ballard J. *Basic concepts of data analysis for community health assessment: Presenting public health data* [Online presentation]. Northwest Center for Public Health Practice site; 2009. http://www.nwcphp.org/training/opportunities/online-courses/presenting-public-health-data. Accessed October 27, 2017.
[25] Strategic Communications. *Using charts*. https://web.archive.org/web/20130310125403/http://www.strategiccomm.com/usecharts.html. 1998. Accessed November 16, 2017.

Pie Charts – "Pie charts show proportional relationships. To be effective, pie charts should not have more than six slices, unless the key point to convey is fragmentation of the whole into numerous small segments."[26] "The 'slices' of the pie are percentages that add up to 100%."[27] The pie slices should always follow the same order used in the legend. This helps readers more easily determine which slice corresponds to which indicator.

In most cases, the largest slice should start at the "noon" position with each smaller slice following in clockwise fashion, as shown below using data from **Cancer Incidence MICA.** However, some data may require that the slices and legend follow a different order. For example, if a pie chart depicts income or age groups, both the legend and the slices should be placed in ascending order based on the group labels, as this order will be more logical to readers. In other words, the Under 1 age group should always appear before the 1-4 age group, even if the 1-4 age group comprises a larger slice of the pie. Regardless of the type of data portrayed, if an "other" category is used, it should always be the last piece of the pie.



Source: Adapted from MODHSS, Cancer MICA

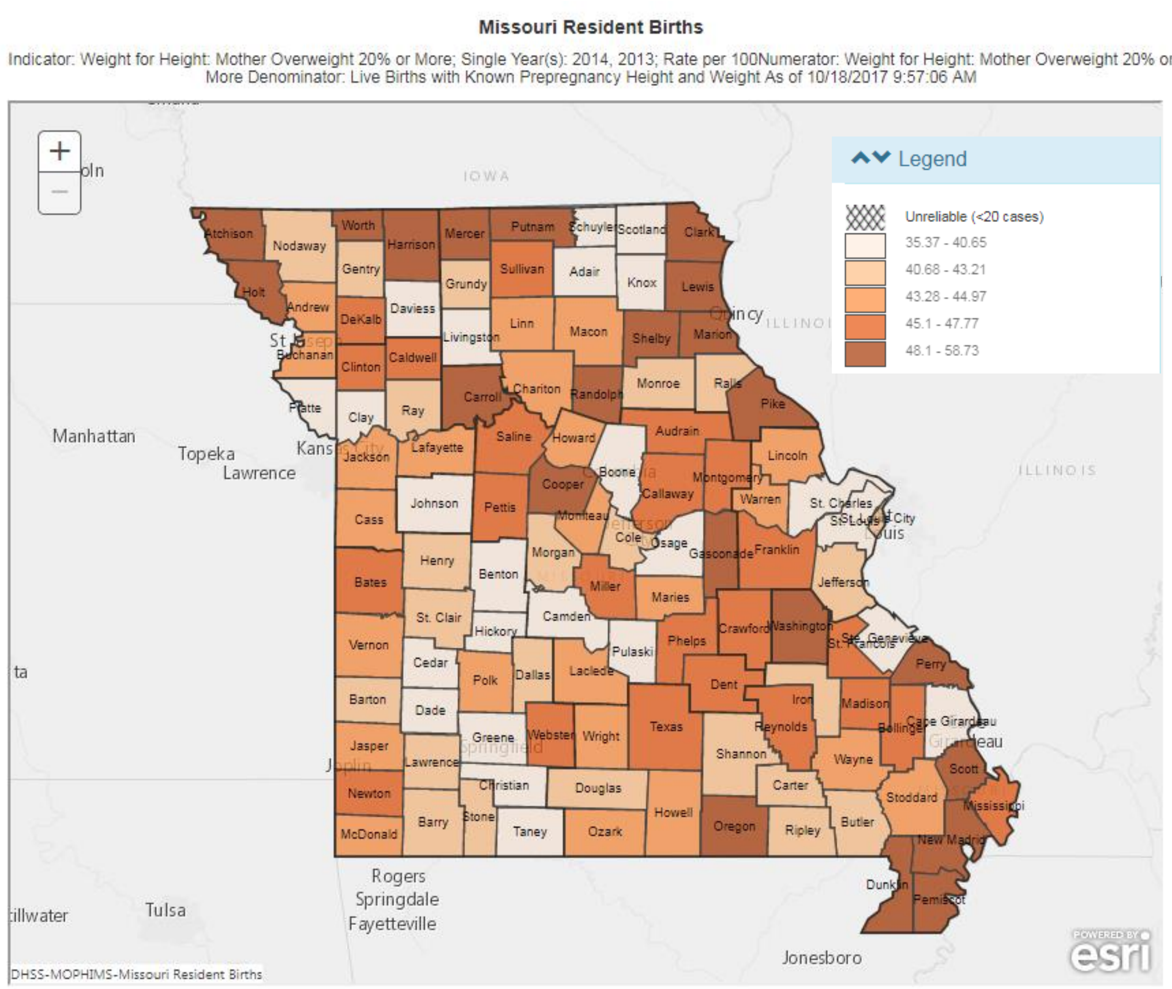
NOTE: The total number of cases does not automatically appear on Excel pie charts. If needed, the Total Cases label must be added using a text box.

[26] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.

[27] Ballard J. *Basic concepts of data analysis for community health assessment: Presenting public health data* [Online presentation]. Northwest Center for Public Health Practice site; 2009. http://www.nwcphp.org/training/opportunities/online-courses/presenting-public-health-data. Accessed October 27, 2017.

Maps – Maps can also be used to display quantitative data graphically. In fact, some sources consider maps to be just another type of chart, a "geographic coordinate chart."[28] They are a "form of visual display of geographical or spatial patterns," as well as a "powerful tool for looking at clusters of diseases."[29] Different types of maps can be used to portray various kinds of data.

Many of the MICAs offer a mapping feature. MICA mapping options include quartile or quintile maps, in which the rates for all 115 counties in Missouri are sorted from highest to lowest and divided into four or five groups, respectively, and significance maps, which show whether each county's rate is statistically significantly different from the state rate. A quintile map using data from **Birth MICA** for the 2013-2014 time period follows.



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[28] MODHSS (Missouri Department of Health and Senior Services). *Module V – Displaying and interpreting epidemiologic variables. Principles of infectious disease epidemiology* [Online course – outline]. http://www.health.mo.gov/training/epi/Mod5StudentOutline.pdf. Accessed October 27, 2017.
[29] Ballard J. *Basic concepts of data analysis for community health assessment: Presenting public health data* [Online presentation]. Northwest Center for Public Health Practice site; 2009. http://www.nwcphp.org/training/opportunities/online-courses/presenting-public-health-data. Accessed October 27, 2017.

Maps are useful for illustrating patterns based on location, but attempting to show too much information on a single map can obscure patterns rather than reveal them. Maps require many of the same considerations as charts, including the use of titles, legends, and distinguishable colors or patterns. The convention when creating shaded maps, such as the MICA map on the previous page, is to use a limited number of colors. "If you have fewer than five or six classes, use one color and vary the shade. Remember that most people can only distinguish up to seven colors. Most people also interpret [higher intensity shades] to mean 'more' or 'greater,' so assign the [most intense] shade to the highest class. . . If you have more than seven or eight classes, you may want to use a combination of colors and shades, using two or even three colors (blue to orange, or blue to green to yellow) to help distinguish the classes. Warm colors (red, orange, or yellow) are a good choice for the classes representing higher values since they highlight these values; cool colors (green, blue, or purple) can be used for lower values."[30] **Using a limited number of colors allows readers to determine at a glance which areas have the highest and lowest rates.** If multiple colors are used, readers will have to refer more frequently to the legend, and patterns may not be as obvious.

***Narrative* –** Viewing tables, charts, or maps allows readers to gain a general sense of data values and possibly data trends. However, none of these presentation formats explain why the data events occurred, and authors may wish to communicate messages that are not apparent at first glance. **Narrative**, or **text**, is the "easiest way to *explain* patterns."[31] The narrative portion of the community health assessment or other report provides the chance to interpret the data from a community.

Example: Following the trend of increased obesity in the state population as a whole, the percentage of births to Missouri resident mothers who are overweight by more than 20% nearly doubled (22.04% to 42.11%) from 1990 to 2014 (MODHSS, Birth MICA).

Narrative, tables, charts, and maps can be used to accentuate each other and provide a more complete understanding of the data. They should strategically reinforce the message being conveyed. Suppose a county wants to use an assessment report to advocate for additional funding to continue a successful health intervention program. A table or a graph could be used to show the prevalence of a particular condition or risk factor compared to other conditions or risk factors, illustrating the necessity of the program. Alternatively, a map could be used to compare the county's prevalence rate for the condition or risk factor to the rates in other counties. The narrative portion of the report could explain strategies used by the program, while another

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[30] Mitchell A. *The ESRI® guide to GIS analysis, volume 1: Geographic patterns & relationships*. Redlands, CA: Environmental Systems Research Institute, Inc.; 1999.

[31] Miller J. *Organizing data in tables and charts: Criteria for effective presentations* [PowerPoint slides and notes]. National Association for Public Health Statistics and Information Systems (NAPHSIS): https://naphsis-web.sharepoint.com/Pages/OrganizingdataintablesandchartsCriteriaforeffectivepresentation.aspx. Accessed October 27, 2017.

chart could graphically show a decline in the incidence or prevalence of the condition or risk factor since the program's inception. Each format reinforces the messages provided by the others. Furthermore, this "technique permits readers who rely on text and those who rely more on numbers [or graphics] to [all] have access to the material."[32]

Citations

Whenever data are presented in a table, on a chart, or in narrative, the source must be cited. These citations are necessary for several reasons. First of all, citations can be extremely useful to the author of a report or presentation. They allow the author to document exactly when and where a source was accessed so that he or she can check for updates to the data at a later time. Furthermore, community health assessments and grants tend to be long-term projects. If the main author must be out of the office or moves on to a different position, citations can guide other staff members to appropriate source material.

Citations are also useful to readers. They allow readers to verify data that they may doubt. For instance, a concerned citizen may question the agency about a statistic that does not appear to match data from another source. With a citation, that reader and/or the author can locate the original source material to research possible differences in the collection, analysis, or interpretation of the data and determine the differences between the two sources. Thus, the use of citations can enhance readers' perceptions of the validity and reliability of a report. Citations can also lead readers to more in-depth information on specific topics that may interest them. For example, readers of this handbook can refer to the footnotes and the References section if interested in a particular topic covered in this course.

Perhaps most importantly, citations can help writers avoid charges of plagiarism. Plagiarism is "the uncredited use (both intentional and unintentional) of somebody else's words or ideas. . . A charge of plagiarism can have severe consequences, including . . . loss of a job, not to mention a writer's loss of credibility and professional standing."[33] A citation is necessary if another person's idea is used, even if it is restated and not directly quoted.

Several different style sheets exist, but BHCADD analysts use the American Medical Association (AMA) style to cite works published by our unit. Major peer reviewed public health journals require this style be used when submitting abstracts for potential publication. The AMA publishes manuals explaining AMA style and offers free brief tutorials and quizzes on its website, located at http://www.amamanualofstyle.com/.

[32] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.

[33] Stolley K., Brizee A., and Paiz J. M. *Overview and contradictions*. *Purdue University Online Writing Lab (OWL)*. http://owl.english.purdue.edu/owl/resource/589/01/. Last edited October 10, 2014. Accessed November 16, 2017.

BHCADD recommends that in-text citations of the Profiles and MICAs list the specific MICA or Profile as the specific item cited, followed by MOPHIMS as the name of the website. Bibliography entries should include the tool used as the specific item cited, MOPHIMS as the website used, the appropriate URL, and the date accessed.

Profile in-text citation:

A total of 95,514 Missouri children under the age of 6 were tested for lead poisoning in 2010.[1]

1. DHSS, Child Health Profile.

Profile bibliography entry:

Missouri Department of Health and Senior Services (DHSS). Child Health Profile. MOPHIMS (Missouri Public Health Information Management System). https://webapp01.dhss.mo.gov/MOPHIMS/ProfileBuilder?pc=1. Accessed October 11, 2017.

MICA in-text citation:

The death rate for Barry County residents decreased from 992.7 (per 100,000 residents) in 2008 to 800.1 in 2009.[2]

2. DHSS, Death MICA.

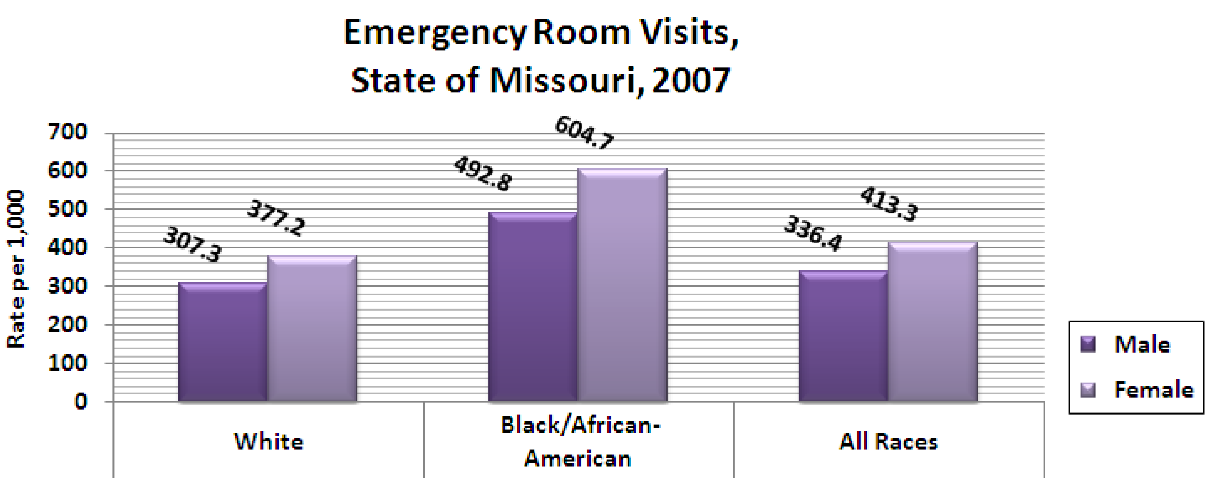
MICA bibliography entry:

Missouri Department of Health and Senior Services (DHSS). Death MICA. MOPHIMS (Missouri Public Health Information Management System). https://webapp01.dhss.mo.gov/MOPHIMS/QueryBuilder?qbc=DM&q=1&m=1. Accessed October 11, 2017.

Formatting Tips

When using a chart, table, or map, "attempt to embed [it] within the text after, not before, the pertinent narrative. If this is not possible, place [it] on the next page following the narrative . . ."[34] At the very least, include a few lines of text introducing the item. Also, be sure to "choose the right format to display data."[35] When trying to show changes over time, a line graph may be more useful than a bar or a pie graph. Furthermore, "maximize ink devoted to the data themselves. In other words, focus on the information being conveyed, and not on elements such as labels, frames, gridlines, ticks, or other symbols. Minimize ink that does not depict the data."[36] For example, compare the following two charts and how well they convey the same **Emergency Room MICA** data.

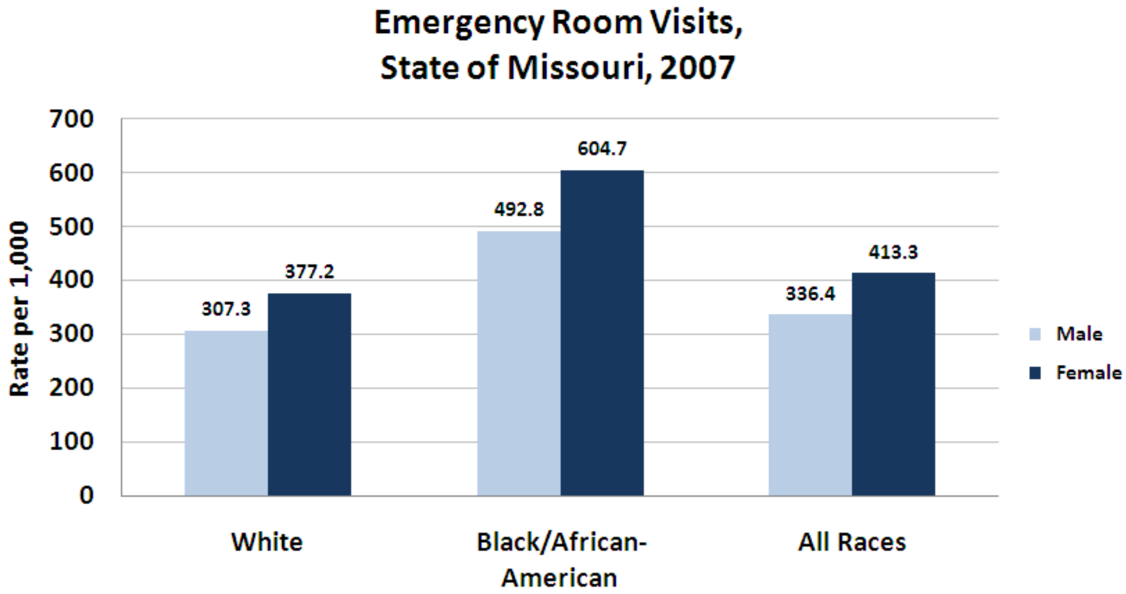
Formatting Example #1



	White	Black/African-American	All Races
Male	307.3	492.8	336.4
Female	377.2	604.7	413.3

[34] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.
[35] Ballard J. *Basic concepts of data analysis for community health assessment: Presenting public health data* [Online presentation]. Northwest Center for Public Health Practice site; 2009. http://www.nwcphp.org/training/opportunities/online-courses/presenting-public-health-data. Accessed October 27, 2017.
[36] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.

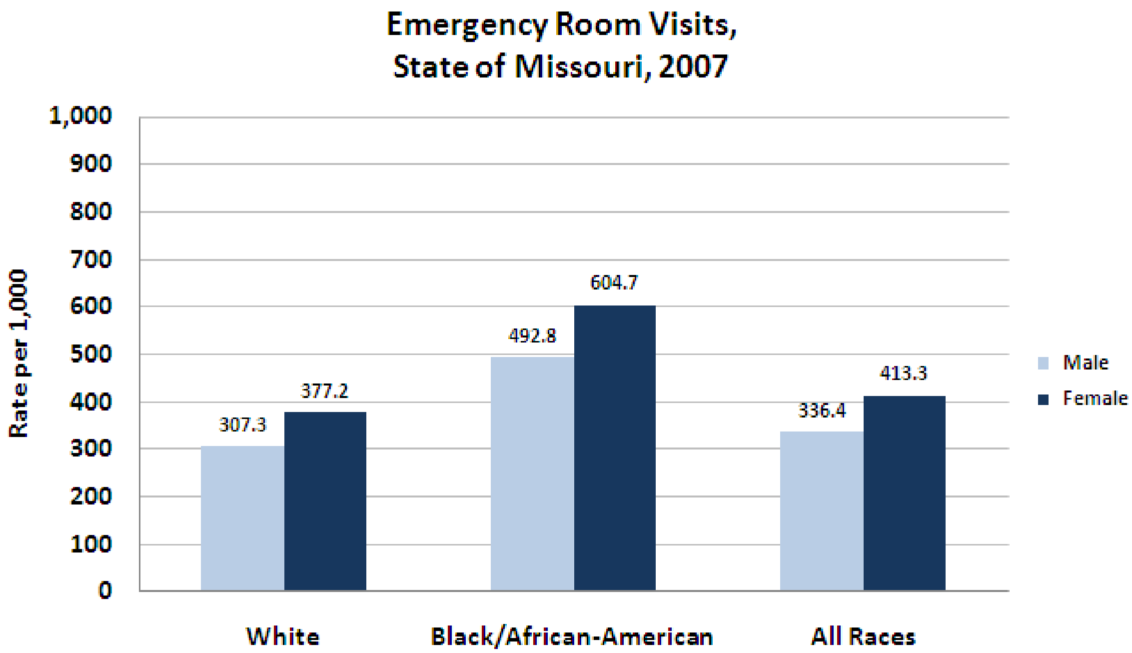
Formatting Example #2



The extra lines and labels on the first chart make it appear very busy. The second chart uses a much simpler design but instantly draws the reader's attention to the data being displayed. Furthermore, the table included in the first example is unnecessary. All of the data on the table are shown in the chart, and the point of using a chart is to graphically portray the data. However, both examples use data labels above the bars so that readers can determine exact rates. If the exact rates are listed in accompanying text, the data labels could be removed as well.

One of the most important aspects of a chart in terms of reader perceptions is the scale. Both the analyst and the reader must be aware that the scale used can have a major impact on the appearance of the graph. For example, in the two bar charts above, the horizontal axis scale ranges from 0 to 700. However, the horizontal axis label indicates that the constant used for these rates is 1,000. Although the chart accurately shows that there are differences between the racial groups portrayed, the scale may exaggerate the true prevalence of ER visits for all groups because the rates are graphically shown on a scale (0 to 700) that is smaller than the constant (1,000) actually used to calculate the rates. Compare Example #2 above to the chart on the next page, which uses a horizontal axis scale from 0 to 1,000.

Formatting Example #3

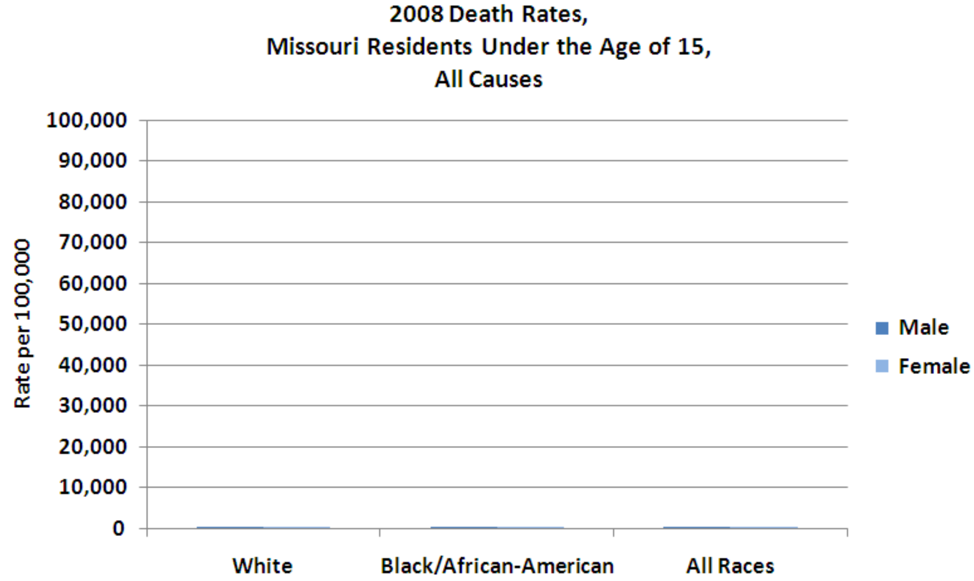


Here the differences between the racial groups are still clearly shown, but readers can more easily visually discern the prevalence of ER visits for each racial group. Many software programs, including Microsoft Excel, automatically set the scale based on the highest and lowest values entered in a table. Users may wish to manually adjust the horizontal axis scale to the appropriate constant.

NOTE: If a series of charts is included in a document for comparison purposes, all charts in the series must use the same scale so that readers can make meaningful comparisons.

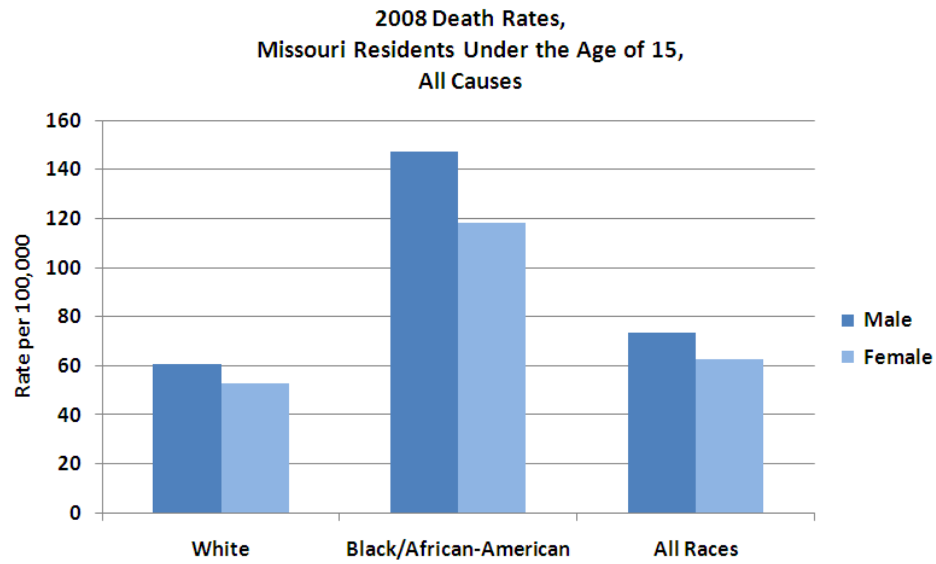
In many instances the use of the full constant on the scale may not be possible. For example, 100,000 is generally used as the constant for death rates, but the death rates for some causes of death and some populations are very small. Example #4 depicts death rates taken from **Death MICA** for Missouri residents under the age of 15. Even though all causes of death are included, the rates are still so small that, when shown on a scale of 0 to 100,000, the chart appears distorted and the reader learns little.

Formatting Example #4



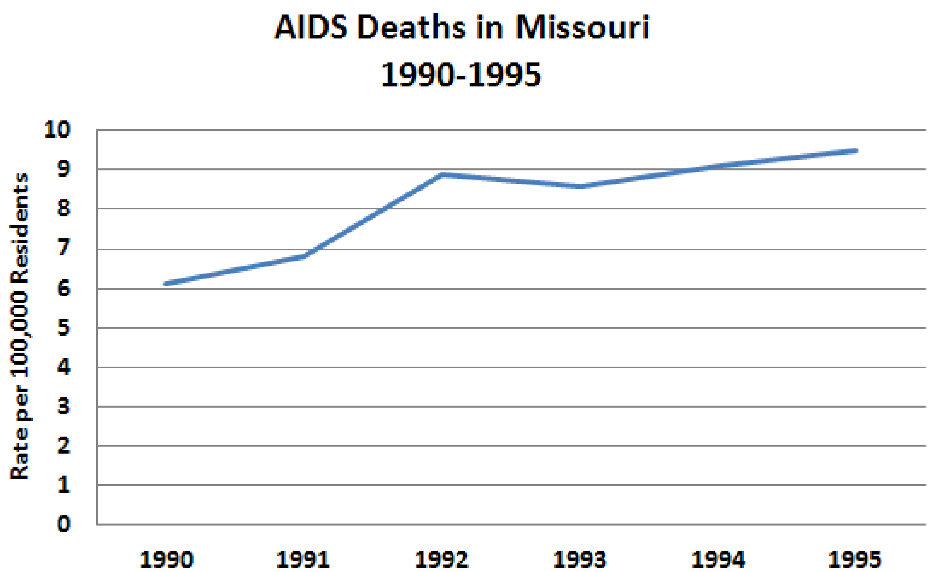
Thus, sometimes use of a maximum axis value that is less than the full constant will be most appropriate. Example #5 shows the same data as Example #4, but #5 uses a more reasonable scale, which allows readers to analyze the differences between the demographic groups. **These examples illustrate why appropriate axis labels, which must include the constant for rates, are critical.** Even though the maximum axis value does not equal the constant used in calculating the rates, readers can still determine the incidence because appropriate axis labels are used.

Formatting Example #5

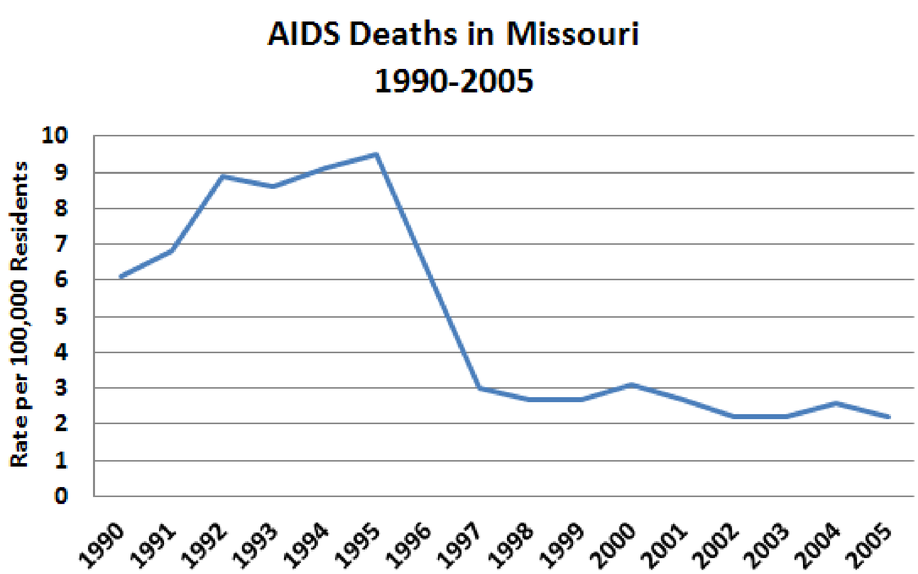


When gathering any type of data for analysis, an element that must be given careful consideration is the number of years of data to be used. This decision may have important ramifications for the interpretation of the data. For example, consider the different messages portrayed by the following two line charts displaying data from **Death MICA**.

Formatting Example #6



Formatting Example #7



The two charts depict the same data from the same source, but the use of only six years of data presents a different trend than the use of sixteen years of data. Thus, a writer must analyze the available data and make a fair assessment of which data should be included. Some knowledge of the data (i.e., collection, modification, or reporting issues) is often important in making this choice. **An author should not selectively include or exclude data to support a particular position.**

Please note that the suggestions presented in this section are general guidelines only and that authors should always consider audience needs when preparing any form of communication.

Color

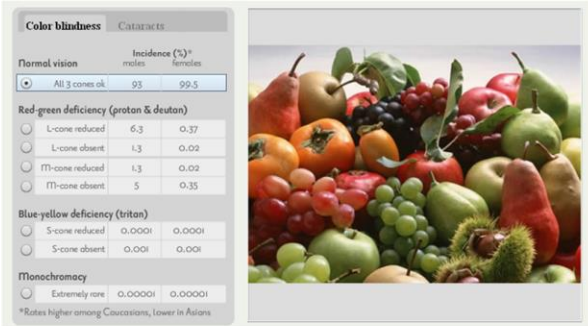
Color can be used to enhance tables, charts, maps, and even narrative but requires some additional thought. "The color wheel is the structured arrangement and relationship of hues, ranging in clockwise order—red, orange, yellow, green, blue and violet. Colors opposite each other—red and green, orange and blue, yellow and violet—are most complementary."[37] They are very effective at illustrating contrast. Colors adjacent to each other are analogous and are useful for illustrating unity.[38]

Source: Color Matters, http://www.colormatters.com/colortheory.html

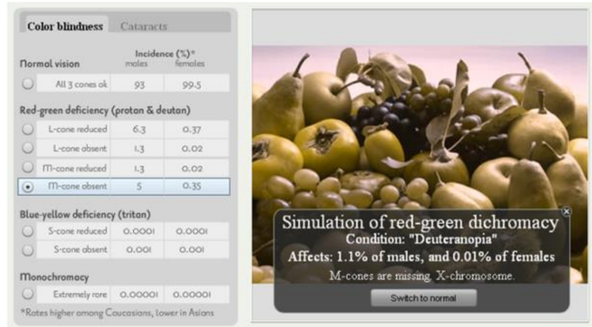
However, keep in mind that many readers may suffer from some degree of color blindness, particularly red-green color blindness. To ensure that those readers can still understand the meaning of your reports and presentations, take the following steps: "Use high contrast colors; Code colors to support color blind users; Don't rely on hue differences alone, also use intensity differences."[39] If using patterns instead of colors, make sure that the pattern combinations do not cause "visual irritation."[40]

[37] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.
[38] Color Matters. (n.d.) *Color theory*. http://www.colormatters.com/colortheory.html. Accessed October 27, 2017.
[39] Ballard J. *Basic concepts of data analysis for community health assessment: Presenting public health data* [Online presentation]. Northwest Center for Public Health Practice site; 2009. http://www.nwcphp.org/training/opportunities/online-courses/presenting-public-health-data. Accessed October 27, 2017.
[40] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.

Non-Color Blind Vision

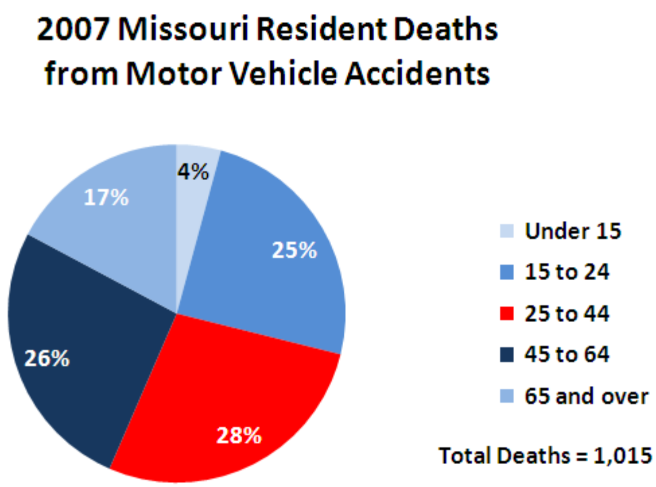


Color Blind Perspective



Source: Web Exhibits, http://www.webexhibits.org/causesofcolor/2.html

"Colors can be used very effectively to emphasize or convey meaning, as long as the use of color is compatible with convention. For example, the color red is associated with . . . monetary losses; conversely, the color green is associated with . . . monetary gains."[41] Use darker or bolder colors to indicate problem areas. For instance, on the following pie chart illustrating motor vehicle deaths by age group (taken from **Death MICA**), the largest slice is red. The remaining slices are all blue, but the largest of those slices is the darkest shade of blue, while the smallest slice is the lightest shade of blue.



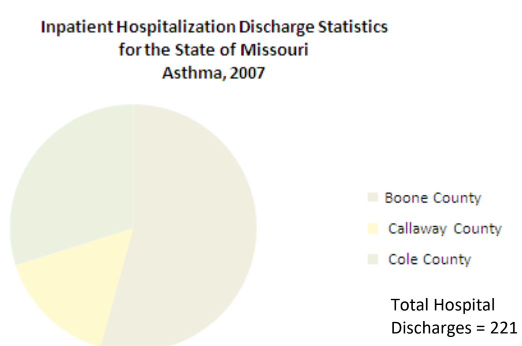
Color should almost always be used in presentations, especially now that presentation software such as Microsoft PowerPoint is readily available in most offices. "For many audiences, black and white presentations suggest a lack of professionalism and seem old

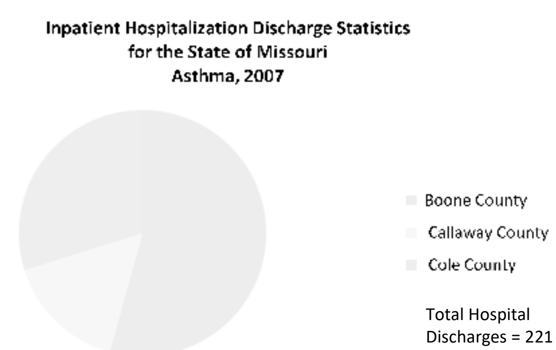
[41] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.

fashioned, even if the content itself is exemplary."[42] When preparing printed reports, the cost of color printing must be weighed against the benefits gained by using color.

The 2010 and later versions of Microsoft Excel allow users to choose from several different color themes. Users can also create custom color themes and save them. This feature can be very useful if an organization wishes to match the colors of its logo or if a set of colors is determined to work well for usage in presentations and reports. Using "the same color scheme in all charts and tables in a set" makes publications look more professional.[43]

When color is used, keep in mind that members of the audience may choose to print or copy the information using a black and white printer or copy machine. "Confirm [that all] charts will be legible when printed in black ink."[44] Furthermore, color settings are not always consistent from monitor to monitor or from monitor to printer. Early in a project, before much time is spent designing a color scheme, print a few test pages in both black and white AND color and email the document to other users to see how the images appear when printed and when viewed on other computers. For example, if readers reprint the following pie chart in black and white, they will not be able to determine which slice of the pie corresponds to which county, and they may not even be able to distinguish between the different slices. The low intensity colors also may not appear clearly on all monitors, as evidenced by data from **Inpatient Hospitalizations MICA**.





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[42] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.
[43] Ballard J. *Basic concepts of data analysis for community health assessment: Analysis and interpretation of public health data, part I* [Online presentation]. Northwest Center for Public Health Practice; 2009. http://www.nwcphp.org/training/opportunities/online-courses/part-2-basic-concepts-in-data-analysis-for-community-health-assessment. Accessed October 27, 2017.
[44] Ballard J. *Basic concepts of data analysis for community health assessment: Analysis and interpretation of public health data, part I* [Online presentation]. Northwest Center for Public Health Practice; 2009. http://www.nwcphp.org/training/opportunities/online-courses/part-2-basic-concepts-in-data-analysis-for-community-health-assessment. Accessed October 27, 2017.

Clear Communication Summary

The following checklist may be useful for preparing presentations and reports.

Basic Concepts of Data Analysis for Community Health Assessment

Module 4: Presenting Public Health Data

Best Practices Checklist

Basic Design Concepts

- ☐ Chart is legible when printed in black ink.
- ☐ Only one type face is used.
- ☐ No irrelevant data.
- ☐ No red/green combinations.
- ☐ No 3-D or perspective effects.
- ☐ Colored text and backgrounds have sufficient contrast.
- ☐ Colors emphasize data appropriately.

Tables

- ☐ Categories are sorted by size.
- ☐ Like items are clustered together.
- ☐ Row/column spacing is consistent.
- ☐ Extra information is placed in footer.
- ☐ Only necessary data is displayed.
- ☐ Same units are used for comparable data.
- ☐ Labels show exact values.
- ☐ No gridlines.

Charts

- ☐ Only necessary data is included.
- ☐ Same units are used for comparable data.
- ☐ Labels show exact values when necessary.
- ☐ No unnecessary gridlines.

Line Charts

- ☐ Only a few data lines are included.
- ☐ Intervals are consistent.
- ☐ Different color or pattern is used for each data line.
- ☐ Thin data lines are used where possible.

Bar Charts

- ☐ Bars/columns are labeled with the same kinds of terms.
- ☐ Column chart labels are short or text is rotated.
- ☐ Bar chart labels are right-aligned.
- ☐ Colors, shades, and patterns are used to distinguish categories.
- ☐ Grouped columns use darkest shading for the latest or most important data.
- ☐ Bar/column shading has enough contrast to distinguish categories from each other.
- ☐ No perspective or 3-D effects.

Pie Charts

- ☐ Slices are ordered large to small, starting at 12 o'clock.
- ☐ Small slices are combined into an "other" category.
- ☐ Slices are labeled and include their value.
- ☐ No perspective or 3-D effects.
- ☐ Colors, shades, and patterns are can be distinguished between adjacent slides.

Maps

- ☐ Colors, patterns, and shades are distinguish-able.
- ☐ A legend or key is included.
- ☐ Different colors/patterns are used for different categories.

Washington State Department of Health

Northwest Center for Public Health Practice

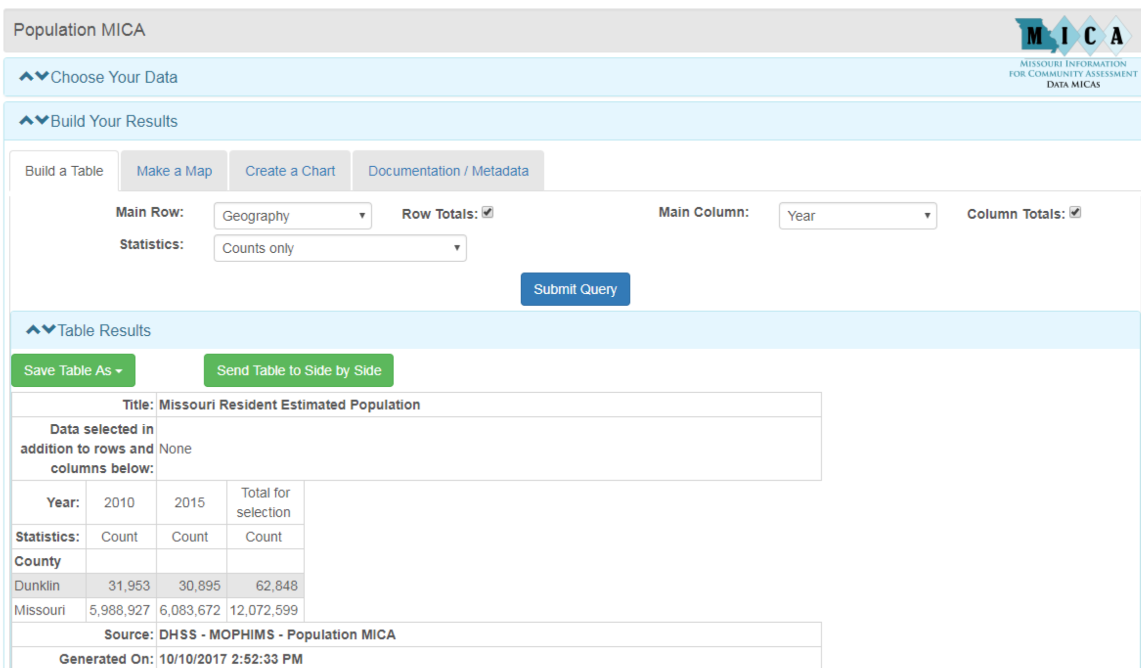
Source: Ballard J. *Basic concepts of data analysis for community health assessment: Analysis and interpretation of public health data, part*

Data Analysis Scenarios

Demographic Data: Dunklin County

The first section of most health-related reports, including community health assessments and grants, should describe the basic characteristics, or demographics, of a community. Demographic data include age, race, ethnicity, gender, socioeconomic standing, and education level, among others. These characteristics are important because they can impact health. Here demographic data will be used to analyze the population of Dunklin County.

Population MICA is a good source for basic demographic data. Using this resource, the following table was created. The following table shows the comparison 2010 population totals for Dunklin County and the state of Missouri to those in 2015.



Title:	Missouri Resident Estimated Population		
Data selected in addition to rows and columns below:	None		
Year:	2010	2015	Total for selection
Statistics:	Count	Count	Count
County			
Dunklin	31,953	30,895	62,848
Missouri	5,988,927	6,083,672	12,072,599
Source:	DHSS - MOPHIMS - Population MICA		
Generated On:	10/10/2017 2:52:33 PM		

An analyst wants to learn how these populations have changed during the five year time span and determine if the trend in Dunklin County is different from the trend for the state as a whole. The analyst chooses to include some of this information in the text but decides against creating a chart or graph. Instead, they choose to calculate the percent change to determine directional difference for the geographies over the given time period, which will then be explained in the opening paragraph of the report.

Percent Change

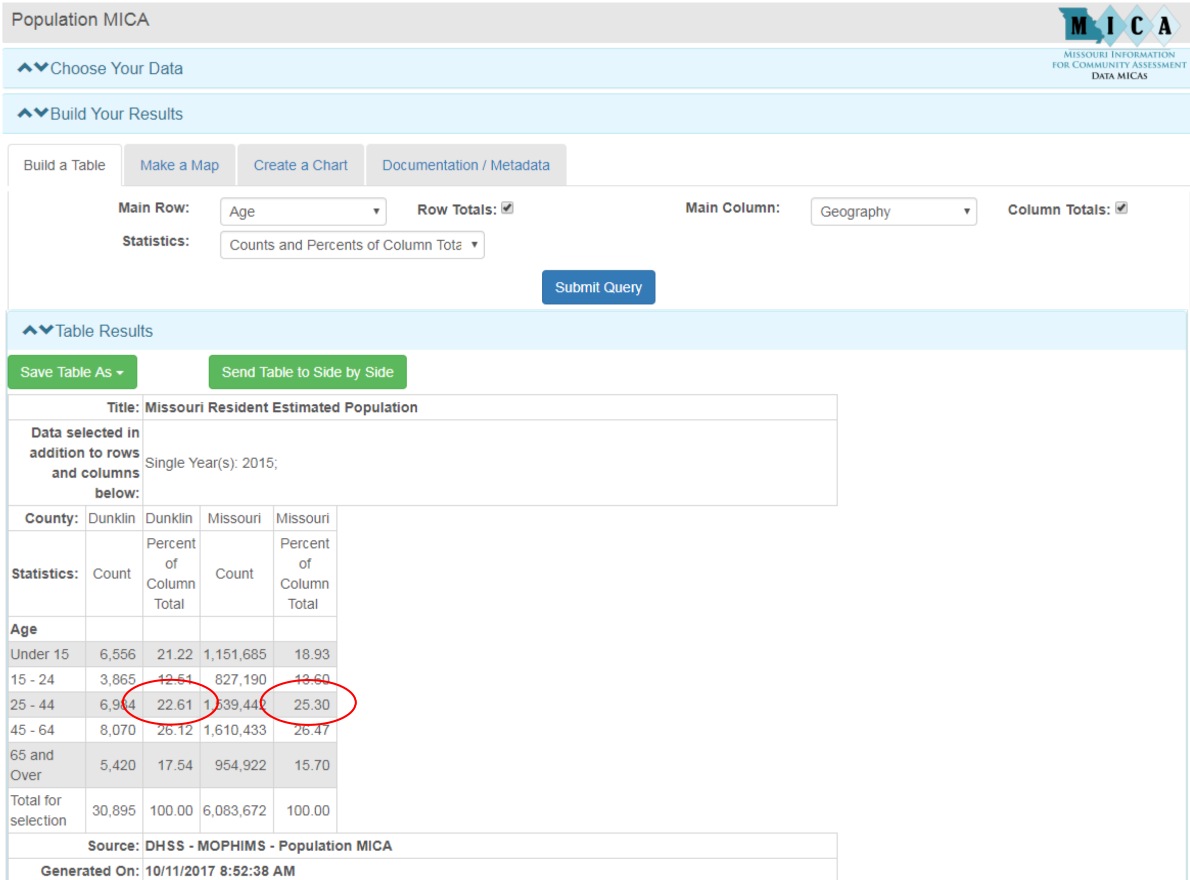
Dunklin County: (30,895 - 31,953) / (31,953) = .0331 x 100 = - 3.31%

Missouri: (6,083,672 - 5,988,927) / (5,988,927) = - .0158 x 100 = + 1.58%

The opening report paragraph will include a relational sentence identifying the base value, comparison value, and in which direction the base value changed in relation to the comparison value. In the case of Dunklin County, the 2015 population was 3.31 % lower than the 2010 population. Statewide, the 2015 population is 1.58 % lower than the 2010 population.

After calculating the state and county percent change, the analyst decides to compare the age composition of Dunklin County to that of the state of Missouri. Age is a risk factor for many diseases and conditions, so this age structure could be an important determinant of the overall health status of Dunklin County. As seen on the previous table, the populations of Dunklin County and the state differ by over five million people. Therefore, it is impossible to make meaningful comparisons using only the population counts. In order to create a better comparison between the two geographies the analyst chooses to add percentages to the table. To do so, the analyst makes the query selections shown on the next page in the **Choose Your Data** portion of the screen.

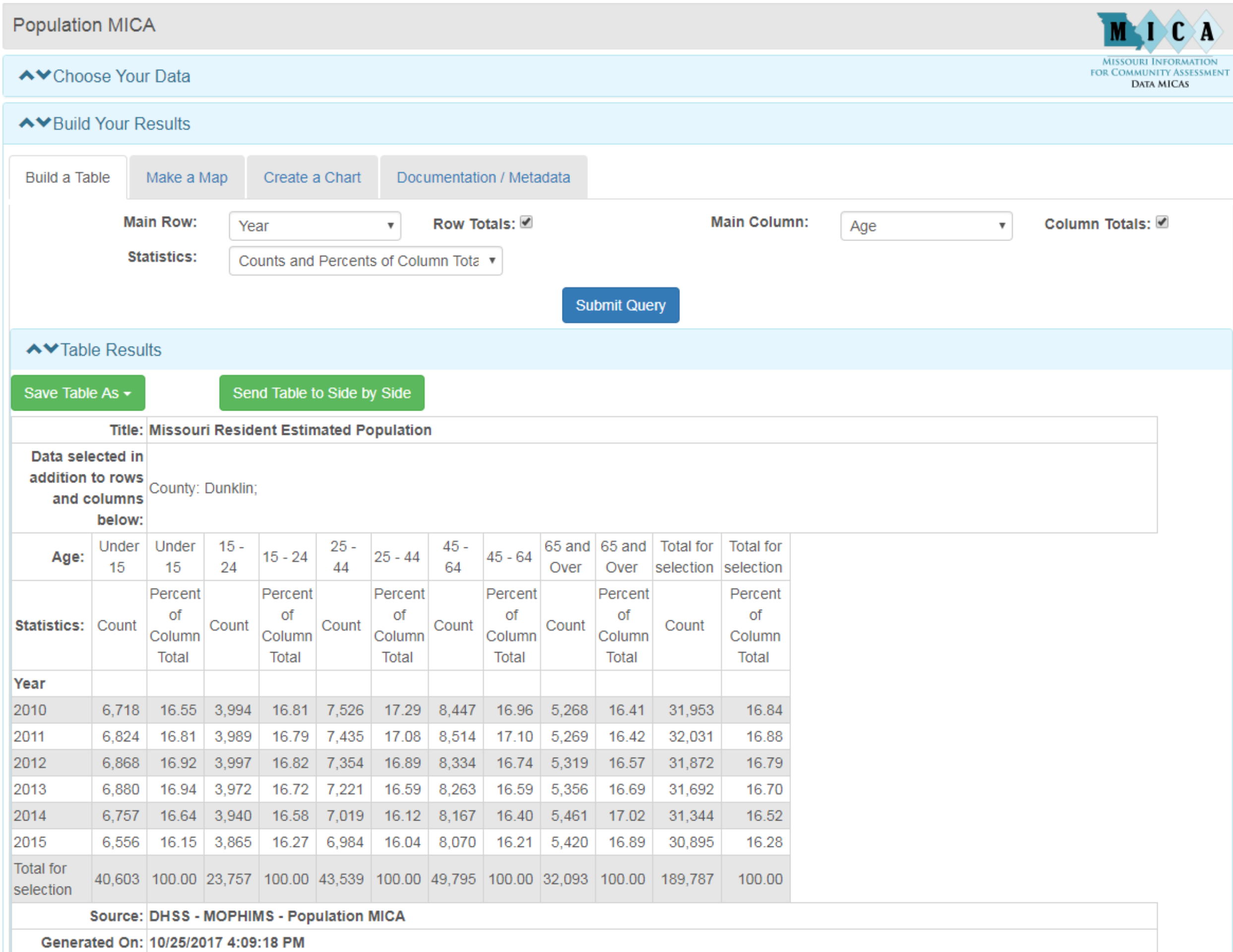
In the **Build Your Results** section the analyst changes **Main Row** to Age, **Main Column** to Geography, and **Statistics** to Counts and Percents of Column Total before submitting the previously shown query.



Title:	**Missouri Resident Estimated Population**			
Data selected in addition to rows and columns below:	Single Year(s): 2015;			
County:	Dunklin	Dunklin	Missouri	Missouri
Statistics:	Count	Percent of Column Total	Count	Percent of Column Total
Age				
Under 15	6,556	21.22	1,151,685	18.93
15 - 24	3,865	12.51	827,190	13.60
25 - 44	6,984	22.61	1,539,442	25.30
45 - 64	8,070	26.12	1,610,433	26.47
65 and Over	5,420	17.54	954,922	15.70
Total for selection	30,895	100.00	6,083,672	100.00
Source:	**DHSS - MOPHIMS - Population MICA**			
Generated On:	**10/11/2017 8:52:38 AM**			

Population MICA allows users to download the table into Excel with the **Save Table As** drop down, so the analyst can place the customized table in to my document.

The age distributions are very similar, so the analyst elects to only point out the largest difference between the geographies (circled in red above) and attempts to explain a possible reason for that difference. Since the analyst now knows how the age groups in Dunklin County compare to those in the state overall, they want to determine if those age groups are changing over time. To see if there have been any major changes, the analyst uses **Population MICA** to create a table that provides six years of data. In the **Choose Your Data** section of the screen, the analyst chooses years 2010 through 2015 from the drop down menu. Because the analyst is primarily interested in the changes in Dunklin County, they deselect the "Show State Totals" box. The analyst then navigates to the **Build Your Results** section and changes the **Main Row** variable from Age to Years and **Main Column** from Geography to Age, producing the table shown in the following.



Title: Missouri Resident Estimated Population

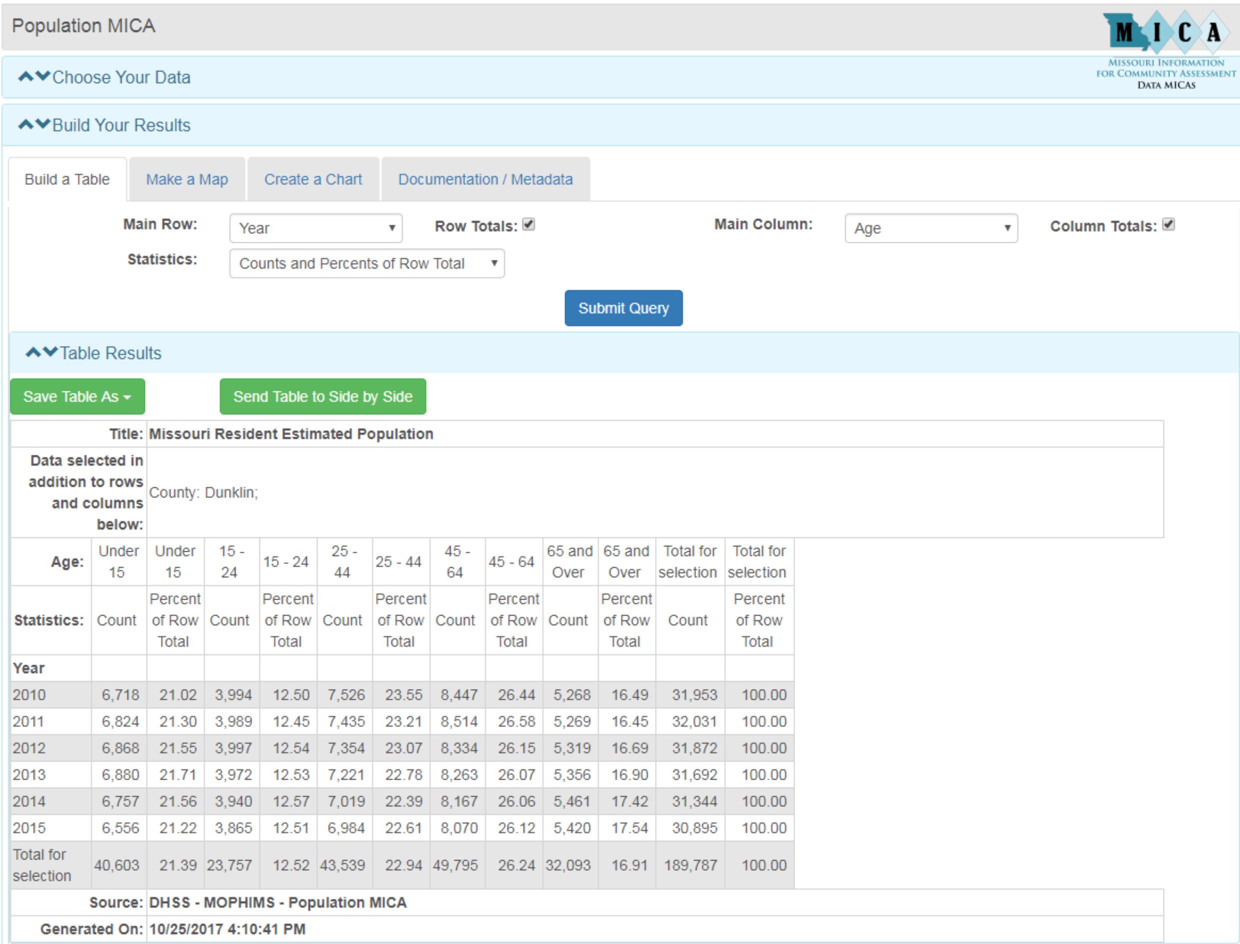
Data selected in addition to rows and columns below: County: Dunklin;

Age:	Under 15	Under 15	15 - 24	15 - 24	25 - 44	25 - 44	45 - 64	45 - 64	65 and Over	65 and Over	Total for selection	Total for selection
Statistics:	Count	Percent of Column Total	Count	Percent of Column Total	Count	Percent of Column Total	Count	Percent of Column Total	Count	Percent of Column Total	Count	Percent of Column Total
Year												
2010	6,718	16.55	3,994	16.81	7,526	17.29	8,447	16.96	5,268	16.41	31,953	16.84
2011	6,824	16.81	3,989	16.79	7,435	17.08	8,514	17.10	5,269	16.42	32,031	16.88
2012	6,868	16.92	3,997	16.82	7,354	16.89	8,334	16.74	5,319	16.57	31,872	16.79
2013	6,880	16.94	3,972	16.72	7,221	16.59	8,263	16.59	5,356	16.69	31,692	16.70
2014	6,757	16.64	3,940	16.58	7,019	16.12	8,167	16.40	5,461	17.02	31,344	16.52
2015	6,556	16.15	3,865	16.27	6,984	16.04	8,070	16.21	5,420	16.89	30,895	16.28
Total for selection	40,603	100.00	23,757	100.00	43,539	100.00	49,795	100.00	32,093	100.00	189,787	100.00

Source: DHSS - MOPHIMS - Population MICA

Generated On: 10/25/2017 4:09:18 PM

When analyzing this table, the analyst discovers that the percentages shown are not the percentages expected. The goal was to see how each age group's percentage of the total population has changed from year to year. Therefore, the age groups in each year should sum to 100%. However, on this table, the total percentage for 2010 is only 16.84%. Closer examination reveals that each age group is summing to 100%, which does not make sense for this analysis. The analyst returns to **Build Your Results** and changes **Statistics** to Counts and Percents of *Row* Total. After submitting the query the analyst can now see (in the table shown on the next page) the percentages based on annual totals and that the age groups in each year total 100%.



Population MICA

Choose Your Data

Build Your Results

Build a Table | Make a Map | Create a Chart | Documentation / Metadata

Main Row: Year Row Totals: ☑ Main Column: Age Column Totals: ☑

Statistics: Counts and Percents of Row Total

Submit Query

Table Results

Save Table As   Send Table to Side by Side

Title: Missouri Resident Estimated Population

Data selected in addition to rows and columns below: County: Dunklin;

Age:	Under 15	Under 15	15 - 24	15 - 24	25 - 44	25 - 44	45 - 64	45 - 64	65 and Over	65 and Over	Total for selection	Total for selection
Statistics:	Count	Percent of Row Total	Count	Percent of Row Total	Count	Percent of Row Total	Count	Percent of Row Total	Count	Percent of Row Total	Count	Percent of Row Total
Year												
2010	6,718	21.02	3,994	12.50	7,526	23.55	8,447	26.44	5,268	16.49	31,953	100.00
2011	6,824	21.30	3,989	12.45	7,435	23.21	8,514	26.58	5,269	16.45	32,031	100.00
2012	6,868	21.55	3,997	12.54	7,354	23.07	8,334	26.15	5,319	16.69	31,872	100.00
2013	6,880	21.71	3,972	12.53	7,221	22.78	8,263	26.07	5,356	16.90	31,692	100.00
2014	6,757	21.56	3,940	12.57	7,019	22.39	8,167	26.06	5,461	17.42	31,344	100.00
2015	6,556	21.22	3,865	12.51	6,984	22.61	8,070	26.12	5,420	17.54	30,895	100.00
Total for selection	40,603	21.39	23,757	12.52	43,539	22.94	49,795	26.24	32,093	16.91	189,787	100.00

Source: DHSS - MOPHIMS - Population MICA

Generated On: 10/25/2017 4:10:41 PM

Although the analyst will need all of these data for the final analysis, there are so many numbers included on the table that it is hard to comprehend. Instead of reproducing the table in the report, the analyst decides to visualize these patterns in a line graph and include this graph in the final report so that readers can more easily see trends. When graphing only a few years of data, a bar chart could be used as an alternative to the line chart. However, if many years of data are to be graphed, line charts are usually the best option.

In **Population MICA** charting using percentages is not an available functionality so the analyst uses the **Save Table As** feature to export the data to Excel and create a line graph based on the percentages.

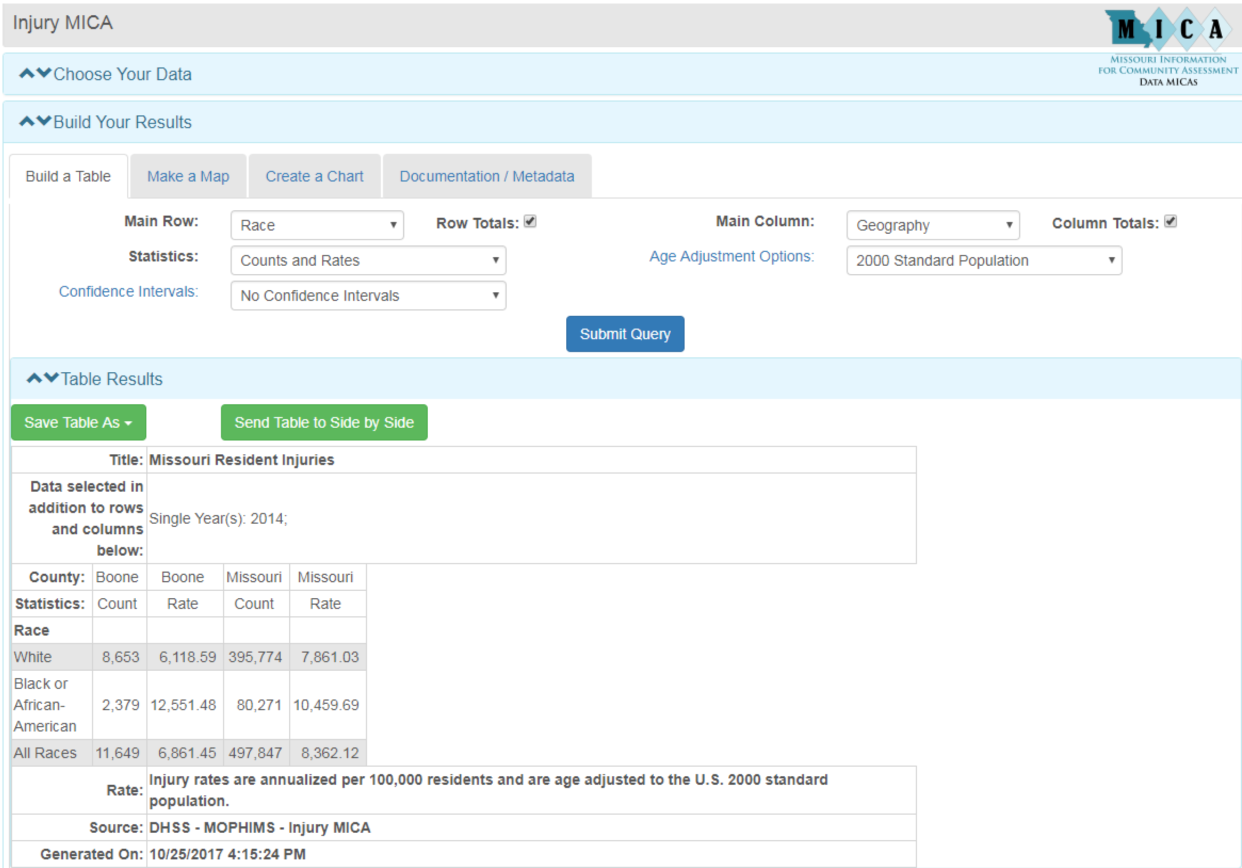
When developing the line chart in Excel, the analyst knows they need to develop the graph based on the percentages, not the counts, because the issue at hand is whether the age *distribution* has changed over time, not whether the population numbers have changed. Percentages can provide more insight into meaningful variations over time rather than counts. Therefore, once the analyst has downloaded the data from **Population MICA** into Excel they can delete the **Count** columns, graphing only the percentages. This allows readers to see the percentage changes and more clearly conveys the intended message. Also, percentages can be interpreted more easily than potentially large frequency counts. Furthermore, using percentages rather than frequencies will allow for a fairer comparison if a reader wishes to compare Dunklin County's age distribution to that of another area.

The analyst must include appropriate contextual information in order to complete the graph, including an overall title and axis labels. The vertical axis label specifies that the numbers on that axis are percentages. The analyst also add a source note beneath the graph to inform readers that it was created using data from **Population MICA**.

Injury Data: Boone County

This section of the sample community health assessment will analyze data related to injuries in Boone County. Areas that may be of concern to readers include the types of injuries occurring, different demographic groups involved, whether the number of injuries is increasing or decreasing, and many other related issues. In the following examples, an analyst will use confidence intervals to determine if there are meaningful differences between the injury rates compared.

Community health assessments will usually require that a county address health disparities among different population groups. **One way to determine if a disparity exists is to compare the confidence intervals for different groups.** For example, the two largest racial groups in Boone County are Whites and African-Americans. The analyst would like to determine if injuries are affecting one of these groups more than the other. To find this information, **Injury MICA** is used. The analyst decides to look at the most recent **Year** of data available, which happens to be the default (in this case 2014) and chooses Boone County from the Geography dropdown. Under **Build Your Results** Race could be displayed along the **Main Row** or **Main Column** so both racial categories can be displayed. The analyst leaves the default variable **Year** as the **Main Column** of interest and to determine statistically significant disparities among the two racial groups, select 95% confidence intervals to be displayed.

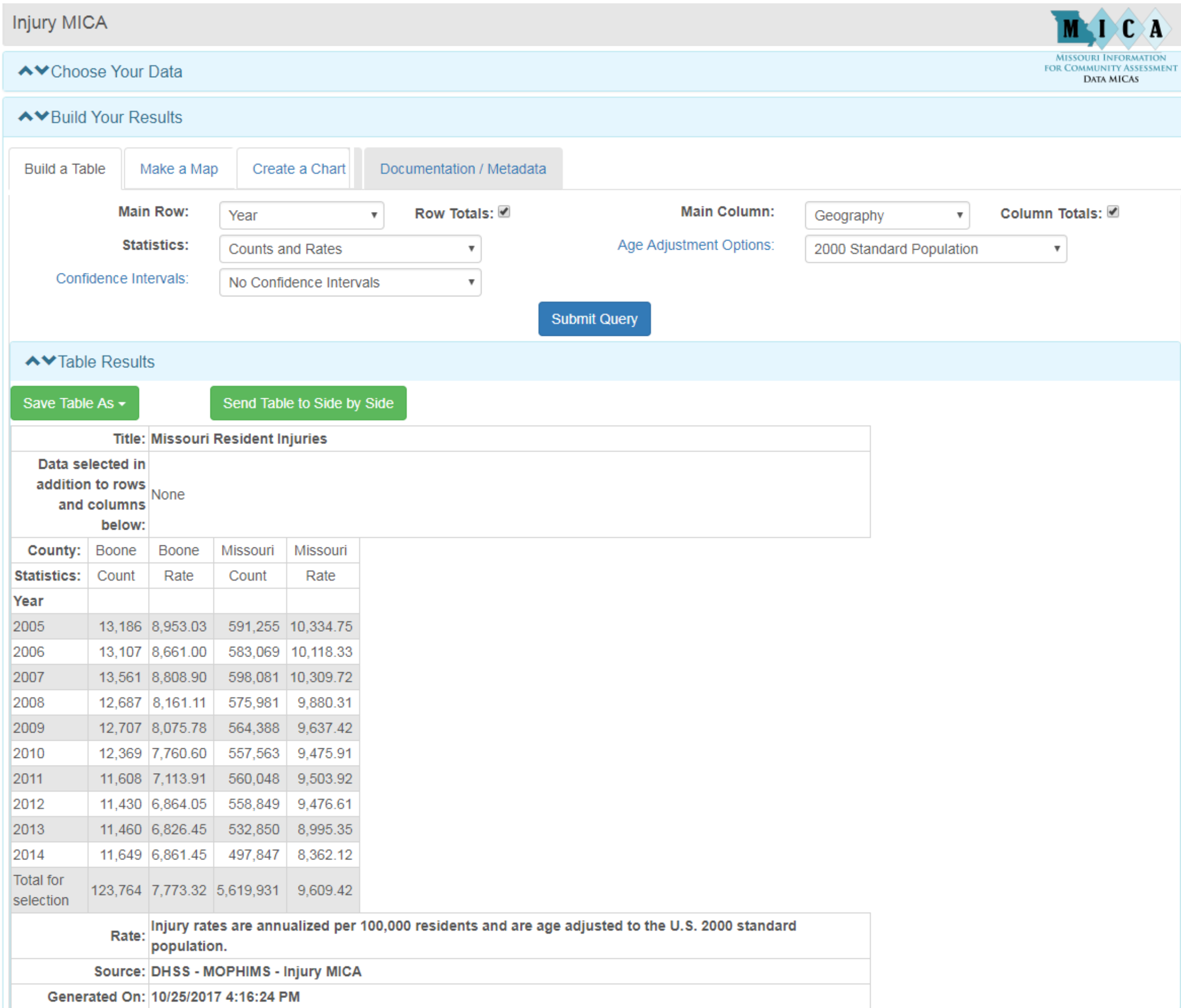


Title:	**Missouri Resident Injuries**			
Data selected in addition to rows and columns below:	Single Year(s): 2014;			
County:	Boone	Boone	Missouri	Missouri
Statistics:	Count	Rate	Count	Rate
Race				
White	8,653	6,118.59	395,774	7,861.03
Black or African-American	2,379	12,551.48	80,271	10,459.69
All Races	11,649	6,861.45	497,847	8,362.12
Rate:	**Injury rates are annualized per 100,000 residents and are age adjusted to the U.S. 2000 standard population.**			
Source:	**DHSS - MOPHIMS - Injury MICA**			
Generated On:	**10/25/2017 4:15:24 PM**			

The confidence intervals for White individuals and Black/African-American individuals can be compared to determine statistical significance. There is no overlap between the two groups and Black-African/Americans clearly have higher injury rates in Boone County. Therefore, it is determined there is a statistically significantly higher rate of injury for Black residents in Boone County than for White residents. It would also be correct to say the rate of injury for Whites is statistically significantly lower than that for Black/African-American residents.

White	5,989.66 —— 6,247.51	
Black/African-American		12,047.11 —— 13,055.86

To compare injury occurrence trends over time additional data years can be added. By returning to **Choose Your Data** and selecting nine additional years preceding the 2014 results, an analyst can then submit a query which allows comparison of the confidence intervals for the last ten years of injury data.



Injury MICA

Choose Your Data

Build Your Results

Build a Table | Make a Map | Create a Chart | Documentation / Metadata

Main Row: Year | Row Totals: ☑ | Main Column: Geography | Column Totals: ☑

Statistics: Counts and Rates | Age Adjustment Options: 2000 Standard Population

Confidence Intervals: No Confidence Intervals

Submit Query

Table Results

Save Table As | Send Table to Side by Side

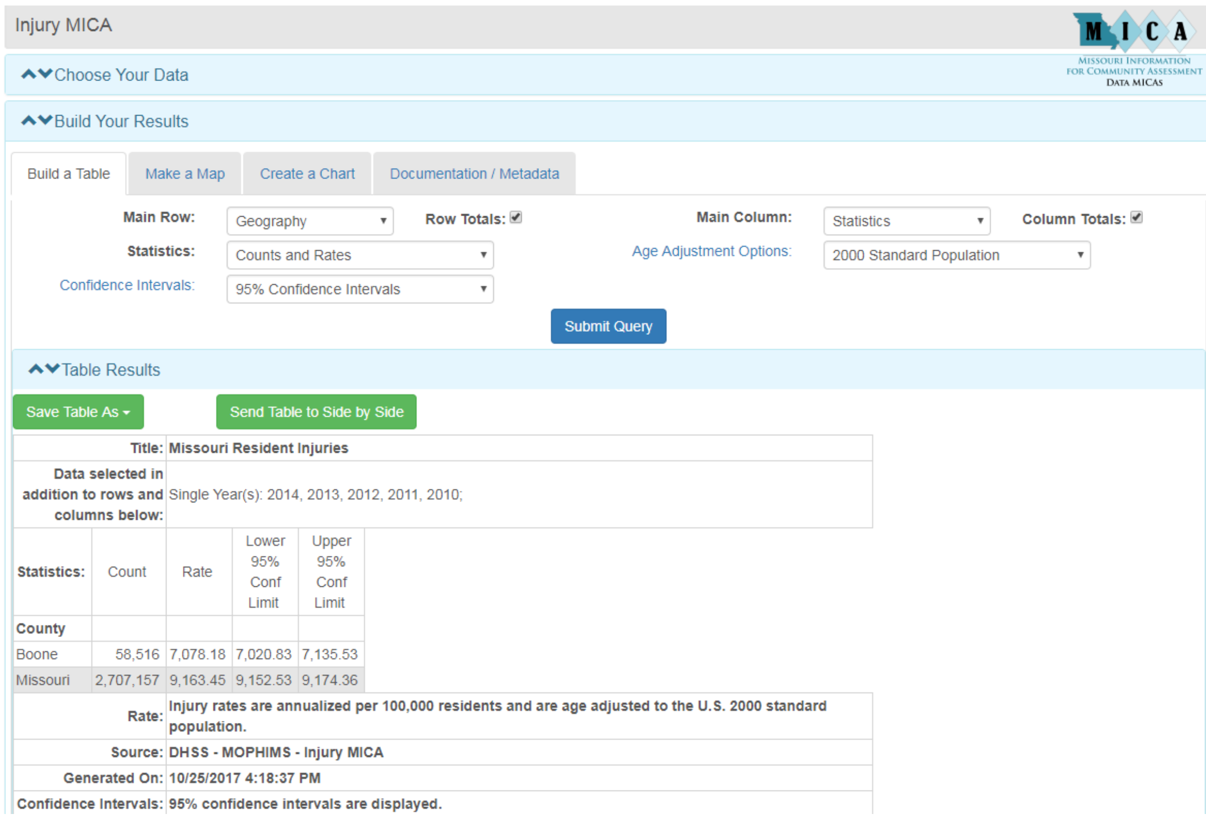
Title:	Missouri Resident Injuries			
Data selected in addition to rows and columns below:	None			
County:	Boone	Boone	Missouri	Missouri
Statistics:	Count	Rate	Count	Rate
Year				
2005	13,186	8,953.03	591,255	10,334.75
2006	13,107	8,661.00	583,069	10,118.33
2007	13,561	8,808.90	598,081	10,309.72
2008	12,687	8,161.11	575,981	9,880.31
2009	12,707	8,075.78	564,388	9,637.42
2010	12,369	7,760.60	557,563	9,475.91
2011	11,608	7,113.91	560,048	9,503.92
2012	11,430	6,864.05	558,849	9,476.61
2013	11,460	6,826.45	532,850	8,995.35
2014	11,649	6,861.45	497,847	8,362.12
Total for selection	123,764	7,773.32	5,619,931	9,609.42
Rate:	Injury rates are annualized per 100,000 residents and are age adjusted to the U.S. 2000 standard population.			
Source:	DHSS - MOPHIMS - Injury MICA			
Generated On:	10/25/2017 4:16:24 PM			

The confidence intervals for 2005, 2006, and 2007 overlap, so there were no statistically significant changes in injury occurrence for Boone County during those years. However, the confidence intervals for the years after 2008 do *not* overlap the intervals from the earlier years. Thus, there was a statistically significant decrease between 2007 and 2008. There was another significant decrease between 2010 and 2011. The analyst should note these findings in their report and determine if this significance warrants a visual representation.

When writing a community health assessment or grant application, the needs of the community should be clearly described. A thorough explanation of the community's needs is important because it will allow readers to understand the work that needs to be done and consider the types and amounts of resources that could be utilized to address those needs. However, it is very easy to focus only on problem areas in a community and neglect to describe improvements that have been made. Highlighting positive trends (such as Boone County's improvement in injury rates) in assessments and grant applications is just as important as describing problem areas. A report that is completely negative will only discourage the community. Including positive trends shows that the community has the potential to make improvements and recognizes the community's prior achievements.

As demonstrated, confidence intervals can be a valuable tool for analyzing data. However, overall context must be kept in mind when using confidence intervals.

1. Compare injury occurrence in Boone County to that in the State of Missouri and generate the following table using **Injury MICA**.



Title:	Missouri Resident Injuries			
Data selected in addition to rows and columns below:	Single Year(s): 2014, 2013, 2012, 2011, 2010;			
Statistics:	Count	Rate	Lower 95% Conf Limit	Upper 95% Conf Limit
County				
Boone	58,516	7,078.18	7,020.83	7,135.53
Missouri	2,707,157	9,163.45	9,152.53	9,174.36
Rate:	Injury rates are annualized per 100,000 residents and are age adjusted to the U.S. 2000 standard population.			
Source:	DHSS - MOPHIMS - Injury MICA			
Generated On:	10/25/2017 4:18:37 PM			
Confidence Intervals:	95% confidence intervals are displayed.			

In this example, Boone County's rate of injury occurrence is significantly lower than the state rate of injury occurrence. Does this mean that Boone County definitely does not have a problem with injuries?

Suppose the analyst researches this topic further and finds that Missouri's rate of injury occurrence is statistically significantly higher than the US rate. Therefore, even though Boone County's rate is significantly lower than the Missouri rate, it could still be significantly higher than the rate for the rest of the nation!

Boone County		7,020.83------7,135.53	
State of Missouri			9,152.53---9,174.36
United States*	6,632.91—6,700.62		

*Fictional confidence interval

2. Whether the desired rate is statistically significantly higher or statistically significantly lower depends on the indicator involved. For example, having a statistically significantly lower rate of undesirable conditions, such as injury-related deaths, is considered to be good. However, if Boone County had a statistically significantly lower rate of lead testing than the state, that would indicate a problem, because Boone County would not be testing as many children as the state overall.

3. Be careful when defining an issue and selecting data for analysis. Suppose the user would like to compare injury hospitalizations to hospitalizations for some other cause, such as heart and circulation problems. **Inpatient Hospitalization MICA** is selected to compare these two diagnoses. The table on the following page shows the number of injury and heart/circulation hospitalizations for Boone County residents from 2010-2014.

Inpatient Hospitalization MICA

MICA
Missouri Information for Community Assessment
Data MICAs

Choose Your Data

Build Your Results

Build a Table | Make a Map | Create a Chart | Documentation / Metadata

Main Row: Diagnosis | Row Totals: ☑ | Main Column: Statistics | Column Totals: ☑

Statistics: Counts and Rates | Age Adjustment Options: 2000 Standard Population

Confidence Intervals: 95% Confidence Intervals

Submit Query

Table Results

Save Table As | Send Table to Side by Side

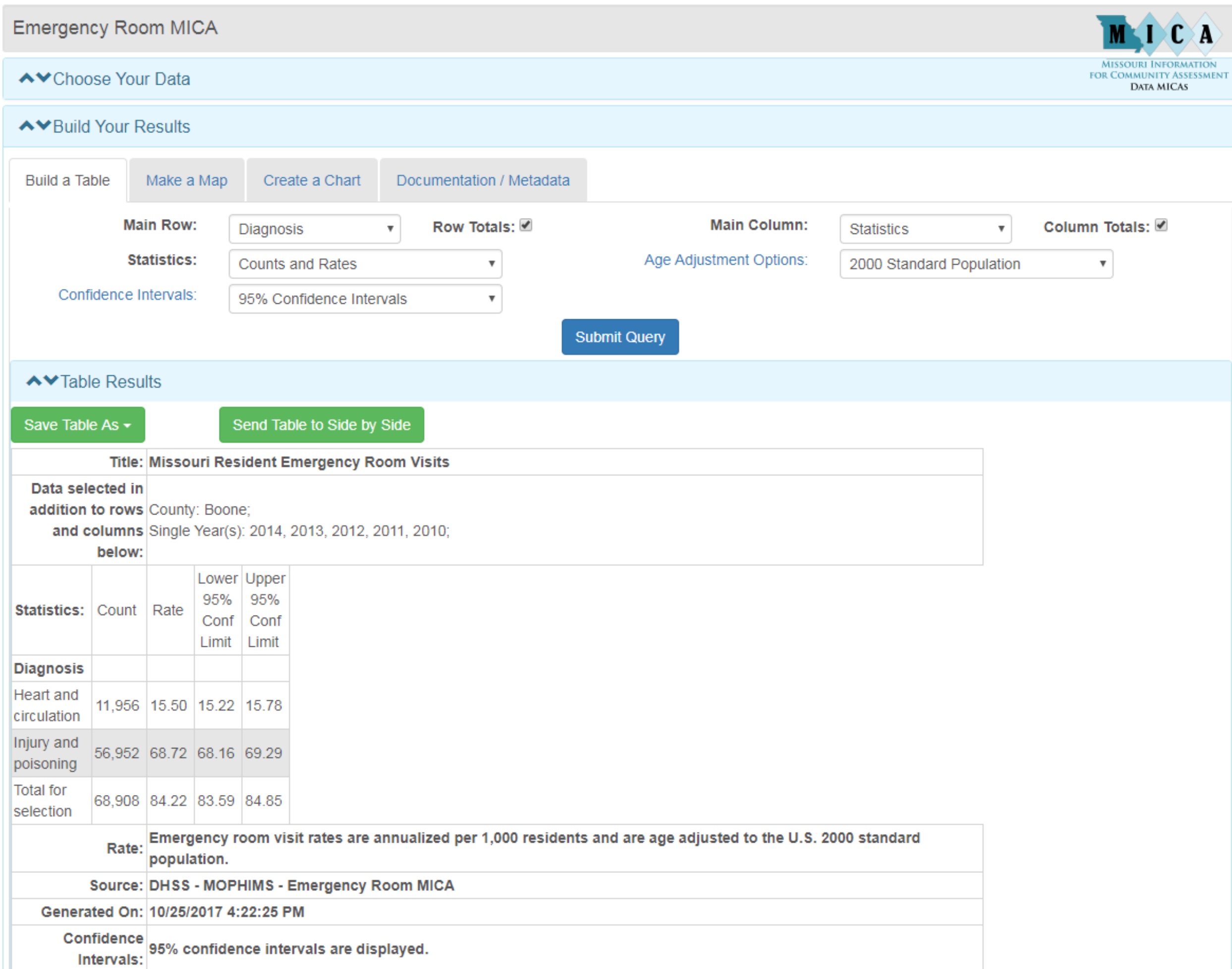
Title:	**Missouri Resident Inpatient Hospitalizations**
Data selected in addition to rows and columns below:	Type of Data: Hospital Discharges; County: Boone; Single Year(s): 2014, 2013, 2012, 2011, 2010;

Statistics:	Count	Rate	Lower 95% Conf Limit	Upper 95% Conf Limit
Diagnosis				
Heart and circulation	9,412	131.72	129.06	134.38
Injury and poisoning	6,796	89.10	86.98	91.22
Total for selection	16,208	220.83	217.43	224.23

Rate:	**Inpatient hospitalization rates are annualized per 10,000 residents and are age adjusted to the U.S. 2000 standard population.**
Source:	**DHSS - MOPHIMS - Inpatient Hospitalization MICA**
Generated On:	**10/25/2017 4:21:13 PM**
Confidence Intervals:	**95% confidence intervals are displayed.**

The 95% confidence interval for heart/circulation hospitalizations is statistically significantly higher than the 95% confidence interval for injury-related hospitalizations. According to these data, heart/circulation problems may be more of an issue in Boone County than injuries.

However, when analyzing some other type of data, a different picture may emerge. For instance, use **Emergency Room MICA** to find the 95% confidence intervals for injury and heart/circulation ER visits from 2010-2014.



Title:	**Missouri Resident Emergency Room Visits**
Data selected in addition to rows and columns below:	County: Boone; Single Year(s): 2014, 2013, 2012, 2011, 2010;

Statistics:	Count	Rate	Lower 95% Conf Limit	Upper 95% Conf Limit
Diagnosis				
Heart and circulation	11,956	15.50	15.22	15.78
Injury and poisoning	56,952	68.72	68.16	69.29
Total for selection	68,908	84.22	83.59	84.85

Rate:	**Emergency room visit rates are annualized per 1,000 residents and are age adjusted to the U.S. 2000 standard population.**
Source:	**DHSS - MOPHIMS - Emergency Room MICA**
Generated On:	**10/25/2017 4:22:25 PM**
Confidence Intervals:	**95% confidence intervals are displayed.**

Thus, although injury-related *hospitalizations* are statistically significantly lower than heart and circulation *hospitalizations*, injury *ER visits* are statistically significantly higher than heart and circulation *ER visits*.

One interpretation of these data is that heart and circulation problems are usually more severe and more likely to require hospitalization, but injuries affect a much larger number of people. In most cases, multiple types of data should be considered when setting priorities.

NOTE: Always check to see if rates (and confidence intervals) are based on the same constant when making comparisons. In these examples, rates were per 100,000 on **Injury MICA**, 10,000 on **Inpatient Hospitalization MICA**, and 1,000 on **Emergency Room MICA**. Comparisons between rates were originally made on the same table. To make comparisons between tables from two different MICAs, the user would need to convert one set of rates to the constant used on the other table. For example, to compare an ER Visit rate of 525.3 per 1,000 to a rate from **Death MICA**, the rate must be converted to the **Death MICA** default constant of 100,000. Move the decimal to the right two more spaces for a rate of 52,530.00.

100,000 ÷ 1,000 = 100 * 525.3 = 52,530 per 100,000

A final comment on resource allocation as it relates to data: This handbook focuses on how to most effectively analyze and present data, but data should not be the sole determinant in the prioritization/allocation of time and funding. The data found in MICA or in other sources are only one piece in a complex process used by communities to allocate limited resources. Factors such as amenability to change and community support of particular programs, among other things, may at times trump data-based findings; however, a solid understanding of the numbers will ensure that more informed decisions can be made.

Finishing Touches

Writing Style

In general, most publications, such as community health assessments and grants, should be written in a formal style using third-person point of view (he/she) rather than second-person point of view (you). The use of contractions (can't, didn't) and slang should be avoided. However, sometimes a less formal, or more personal, tone may be appropriate, depending on the nature of the material and the intended audience. For example, materials that will be used for health education or health interventions may be written at a lower language level but also use second-person point of view and slang in order to be more relatable and engaging to readers.

Regardless of the style used, all writing is easier to read and follow if appropriate transitions are incorporated. Transitions are words and phrases that help readers flow from one topic to the next. A writer should anticipate points in the material where readers may become confused and attempt to guide them through difficult passages using transitions. Transitions can also be used to subtly emphasize different points the author wishes to make. Compare the effectiveness of the following paragraphs:

Example 1: Many people find writing about data to be difficult. The process can be simplified. Keep the audience in mind. Present the data in multiple formats. Provide adequate context.

Example 2: Many people find writing about data to be difficult, but the process can be simplified. First, keep the audience in mind. Then, present the data in multiple formats. Finally, provide adequate context.

Example 3: Many people find writing about data to be difficult. However, the process of writing about data can be simplified if principles of clear communication are followed. Most importantly, always keep the audience in mind. Also, present the data in multiple formats to help readers with different learning styles understand it. Finally, provide adequate contextual information so that readers can interpret the true meaning of the information.

A good resource for writing with effective transitions can be found at: https://www.msu.edu/~jdowell/135/transw.html. This website briefly explains transitions, lists a large number of transitional words and phrases, and describes when each would be used.

Like transitions, active voice can also strengthen writing. Active voice refers to the use of an active verb (increased, expanded) rather than a passive verb (is, was). In active voice, the subject of the sentence is actually performing the action of the verb, whereas in passive voice, the subject receives the action of the verb.

Passive Example: The nutrition class is taught by a health educator.
Active Example: A health educator teaches the nutrition class.

Passive voice is not technically incorrect and may be the only option for some sentences. However, if overused, passive voice becomes repetitive and boring to readers. Furthermore, active sentences tend to be more direct and clear. Therefore, passive voice should be used only if absolutely necessary.

The following website explains the process of converting a sentence from passive voice to active voice: http://www.towson.edu/ows/activepass.htm.

Not all sentences containing *is* or *was* are written in the passive voice. Often these terms are used to indicate past tense.

Example 1: Missouri's heart disease mortality rate was declining from 2000 to 2007.
Example 2: Missouri's heart disease mortality rate declined from 2000 to 2007.

However, be cautious of overusing *is* and *was* even in past tense sentences. In general, writing will be stronger and more interesting if *is* and *was* are used sparingly. Consider the impact of the following two paragraphs.

Paragraph 1: Lack of health insurance is a major problem in Adams County. The number of uninsured residents in 2007 was 3,257. This was a large increase over 1997, when only 1,129 residents lacked health insurance. Over the past ten years, health care costs have increased dramatically. As a result, health care costs are a major concern for Adams County residents.

Paragraph 2: Over the past ten years, lack of health insurance emerged as a major problem in Adams County. The number of uninsured residents grew from 1,129 in 1997 to 3,257 in 2007. During this same time period, health care costs increased dramatically. As a result, health care costs continue to be a major concern for Adams County residents.

Executive Summary, Table of Contents, and Index

If a written report is lengthy, adding an executive summary, a table of contents, and an index may help readers to more easily navigate the document.

Executive summaries are useful for audience members who wish to gain a general understanding of the contents of a report but lack the time to read the entire document. "No more than one to two pages, the executive summary provides a very brief description of the methodology, results, and implications of the study. The executive summary is intended to stand alone from the report as well as to be a first section within a more comprehensive document. Consequently, the executive summary needs to be tightly written, present only the most meaningful elements of the research design and significant numerical data, highlight overall conclusions and implications, and tell the reader where to obtain the full report or more information."[45] An example can be found at http://health.mo.gov/data/pdf/2016NosocomialReport.pdf.

A table of contents can be placed at the front of a document to guide readers to major sections of the report. In most cases, entries in the table of contents should exactly match the section labels. Word processing programs, such as Microsoft Word, often contain a feature that quickly generates a table of contents based on label formats. Any text that is formatted in a specified style is automatically included in the table of contents.

An index can be placed at the end of a document to guide readers to key terms used in the report. In Microsoft Word, users must mark the terms to be included in the index. The index feature then finds all instances of each term and includes the appropriate page numbers in the index section.

Internet Publications

Reports can now be published very inexpensively via websites. If a report is to be posted on the internet, be sure that the colors and fonts are still clear on a variety of monitors and browsers. If a report is very large, consider separating it into different sections so that readers can download it more easily. If an organization is required to be ADA (Americans with Disabilities Act) compliant, it should make certain that its website can be read by those with visual disabilities.

[45] Bers T. H., with Seybert, J. A. *Effective reporting*. Tallahassee, FL: The Association for Institutional Research. 1999.

Presentations

Presentations require a few additional considerations. When preparing a narrative report, clear, concise writing is important, but an author has more of an opportunity to fully explain himself or herself in writing. During a presentation, however, the presenter and visual aids must be especially clear and concise in order to convey the intended message in a limited amount of time.

Similarly, although a clear, readable font is necessary in a written report, font size and type become especially critical during a presentation to ensure that all participants can read the information. One of the most common failings of PowerPoint presentations is the use of fonts that are too small or in colors that do not contrast well against the background colors. If large tables of data need to be presented, consider including these tables in a handout so that participants can read them more easily. Handouts are also helpful if participants may need to take notes or if a presentation will be given in a large room in which it may be difficult for all participants to clearly see the visual aids.

No matter how effective visual aids may be, presentations will not be successful if they are not well-organized and polished. Practice is important. Before the main event, practice in front of a small group of people willing to provide constructive criticism and interaction during the rehearsal. "Effective oral presentations frequently require the presenter to make real-time, instant modifications in the material or delivery to accommodate audience responsiveness, or lack thereof."[46] Such a rehearsal allows the presenter to practice observing nonverbal cues from the audience and responding to spontaneous questions.

Proofreading

Allow adequate time to proofread reports and presentations before publishing or presenting them. Take advantage of the spelling and grammar review function that is now available in most word processing software packages, but be aware that these review functions do not catch all mistakes and sometimes flag text that is actually correct. Publications should always be proofread by someone other than the author. Proofreading involves more than simply looking for mistakes in spelling and grammar. Proofreaders should also look for passages that are unclear and sections that lack citations.

Ideally, request that someone with characteristics similar to those of the target audience review the publication. For example, before making a presentation to the general public, ask someone who is not familiar with health data to listen to the presentation and review the visual aids or handouts. Such a person can provide insight into what terms and information the general public might not understand.

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