A **Guide** to **Understanding** and **Using Data** for **Effective Advocacy**

Voices
For Virginia's Children

We encounter data constantly in our daily lives. From newspaper articles to political campaign advertisements to the packaging on consumer products, data are continually used to send messages about the world around us. Data serve many different purposes—to describe, to inform, to educate, and to persuade are but a few ways in which data communicate critical information about today's most important topics.

When clearly presented and appropriately interpreted, data can be a powerful tool to educate decision makers about issues and empower them to enact good policy. Quality data can save valuable time and money by zeroing in on what works and what needs work. It is critical for both users and consumers of data to understand fundamental data principles in order to accurately interpret the information and make sound judgments.

A Guide to Understanding and Using Data for Effective Advocacy is a resource published by Voices for Virginia's Children to assist child advocates in promoting data-driven public policies and programs. Intended for advocates, program administrators, direct service providers, and citizens alike, the Guide offers a user-friendly introduction to statistical concepts and explains common errors users make with data. It is hoped that this document will assist advocates in better leveraging data to advocate for policies based on quality data and best practices.

Voices for Virginia's Children
701 East Franklin Street, Suite 807
Richmond, Virginia 23219
804.649.0184

www.vakids.org

1 in 5 kids has a diagnosable mental illness.

Common Research Terms

Population: A defined group of individuals, usually from which a sample is drawn.

Example: The population of Virginia's children can be defined as all persons under age 18 who reside in the state of Virginia.

Sample: A subset of a population that is intended to represent the larger group.

Example: From the 32,000 students enrolled at the local university, a sample of 3,000 was selected to participate in the survey.

Survey Data: Survey data come from questionnaires or interviews. Surveys are a widely used method of data collection because they allow researchers to collect a large amount of information relatively quickly and inexpensively. There are some basic criteria that can impact the validity of a survey; if these criteria are not met, results should be interpreted with caution.

1) Sample selection. It is important that the sample be selected using random sampling techniques or other systematic methods to reduce sample bias. Always ask yourself how the sample was collected. For example, were all 200 survey respondents recruited outside a single local shopping center? If so, what might be different about the people who shop in that location versus other locations, and how might that influence their responses?

2) Response rate. Response rates tend to vary depending on the type of survey (phone, email, postal mail, face-to-face). Very low response rates are prone to biases that can limit the generalizability of the survey responses. There is no universal threshold for an acceptable response rate, so ask yourself about the survey's intended purpose. Surveys intended to make generalizations about the population should be held to a higher standard than surveys designed for internal use or for gaining initial insight into an issue.

3) Survey items/questions. The most significant problem with questions occurs when they are written in a way that leads the respondent, explicitly or implicitly, to respond in a particular manner. For example, the survey question "In your opinion, what are the benefits of statewide universal pre-Kindergarten programs?" conveys a positive connotation for such programs. Review the survey items to ensure they are clear and neutral.

The legislature approved a 35% increase in payments to foster care and adoptive families.

4) Response scales. Survey items should have response scales that are balanced; that is, there should be the same number of "positive" options as "negative" options. Scale endpoints should be equivalent and clearly written. Here is an example of a well-designed scale:

Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree

Here is an example of an unbalanced scale:

Extremely Important	Very Important	Important	Neither Important nor Unimportant	Unimportant

Similarly, scales that assess frequency of behaviors should contain time categories that are reasonably spaced and appropriate to the behavior being assessed. For example, a response scale for a survey item about how frequently parents read to their children might appear as:

Never	Once per Month	Once Per Week	Once Per Day	More than Once per Day

Where appropriate, scales should be as specific as possible; "2-3 times per month" yields better information than "seldom" or "occasionally." Whether a survey item is forced-choice or provides a "don't know/not applicable" option depends on the item's intended purpose.

Descriptive Data: Descriptive data do exactly what the name implies—describe a sample's characteristics. Descriptive data on demographic characteristics such as age, gender, race/ethnicity, and income are commonly reported in tables or graphs. Descriptive data are also called descriptive statistics or summary data. One key characteristic of descriptive data is that they do not make inferences about the larger population or imply relationships among variables.

Correlational Data: A correlation measures the strength of the relationship between two variables. The most common mistake associated with correlational data is to assume that they imply causation. While the relationship between two variables is informative, we cannot assume that an increase in Variable A caused the increase in Variable B without examining additional factors. For example, one researcher noted a positive correlation between reading ability and shoe size among grade school children. Of course, bigger vocabularies do not cause feet to grow; rather, children's reading skills improve with age, and they naturally outgrow their shoes as they grow taller. Be careful not to assume causation when reviewing correlational data.

Experimental Data: Experimental data are derived from controlled studies in which the researcher manipulates one variable while holding other variables constant. The more consistent all other aspects are between the group receiving the "treatment" and the group not receiving it, the more likely any differences in outcome can be attributed to the manipulated variable. For example, a researcher is interested in whether children learn from media as well as they learn from live demonstrations. She devises a task for 18-month-olds to complete: assembling a three-piece rattle. In one condition, the children watch as a live assistant assembles the rattle. The children in the second condition watch a videotaped demonstration of the assistant assembling the rattle. In the third condition, the children do not view a demonstration. Then the researcher gives the children the three rattle components and measures how long it takes them to assemble the rattle. Experimental data are the "strongest" type of data because, with the right precautions in place, we may infer that group differences are a result of the manipulated variable.

34% of Virginia children ages birth to six live below **200%** of the Federal Poverty Level.

The majority of young children spend significant time in the care of people other than their parents.

Common Measurements

Mean: The mean of a set of values, also called the average, is derived by summing the values then dividing by the number of values in the set. For example, to calculate the average classroom size of five classrooms that contain 19, 21, 22, 22, and 25 students respectively, sum the individual classroom sizes, and divide by the number of classrooms:

$$(19 + 21 + 22 + 22 + 25) / 5 = 21.8$$

The mean is perhaps the most commonly reported type of measurement. Its primary disadvantage is that it can be influenced by outliers, or extreme values.

Standard Deviation: The standard deviation is a measure of a sample's variance, or how "spread out" is the distribution of scores. The standard deviation is useful when comparing two samples that have similar means. For example, if the mean of the math test scores is 78.4% with a standard deviation of 1.1, while the mean of the science test scores is 78.4% with a standard deviation of 6.9, you may infer that there were more very high and very low scores on the science test, whereas most students' standard deviation—in this case, 162.1—were reported with the mean, we would be aware that outliers are present. When the outlier is removed, the mean value becomes 38.5 with a standard deviation of 14.2, which better represents the majority of the data.

Median: The median is derived by arranging all the values in a dataset in ascending (or descending) order, then identifying the "middle" value—i.e., the point in the distribution where there are the same number of values above and below it. For example, the median value in the dataset below is 38:

11, 14, 15, 16, 23, 33, 34, 34, 38, 42, 55, 70, 72, 72, 80, 88, 600

If the dataset contains an even number of values, the middle two values are averaged to yield the median. Because median values are not influenced by outliers, they are often used to report highly variable types of data, such as household income.

Mode: The mode is the most frequently occurring value in the dataset. Like the median, modes are not influenced by outliers. In the example data series above, there are two modes: 34 and 72 both appear twice in the series.

Common Data Problems

1. There are problems with the sample (size and selection). When we have a research question about a population, it is usually impossible to collect data from every person in that population; it becomes necessary to sample the population and collect data from the sample. If sampling is done well it can allow us to draw conclusions about the entire population. However, if the sample size is too small or bias was involved in the selection of the sample, any inferences should be approached with caution.

2. Margin-of-error is ignored. Margin-of-error is commonly used in reporting polling data –for example, the percentage of individuals who voted for Candidate A versus Candidate B. The higher the margin-of-error, the more cautious we should be about reported differences. This is particularly true when sample sizes are very small and thus more sensitive to random fluctuations. Margin-of-error represents the precision of an estimate which comes from a sample. Because a sample is only an approximation of the whole population, even the best-designed surveys yield results that you would expect to vary purely due to random chance. Margin-of-error (sometimes referred to as "standard error") is determined by sample size, standard deviation, and population size.

3. Percentage differences can be deceptive. Percentages are most common form of data reported. Data presented over time often use percentage-increase from year to year. When looking at percentage differences, it is important to know if raw counts are small, which can make small increases in counts appear to be large percentage-increases. Use caution when looking at percentage-changes with small numbers.

4. Comparisons are made between unequal groups. It is very important to make comparisons among groups that are similar. For example, a poll on public education resources reported that 78% of teachers in Flynn County thought that new textbooks was the most critical budget item for which the District should dedicate more funds, while only 32% of teachers in Gloucester County agreed that textbooks were most important. The poll failed to report, however, that most of the Flynn County survey respondents were high school teachers, while the majority of Gloucester County respondents were second-grade teachers. Use caution when making comparisons unless you are sure that important characteristics of the groups are the same.

5. Statistical significance is assumed to be substantive importance. Statistical significance means that the difference between two numbers is probably due to something other than chance. Statistical significance tests are powerful tools that allow us to draw conclusions about research questions. However, a statistically significant result is not necessarily always meaningful; it is the researcher's and/or data consumer's responsibility to evaluate the results in context. This is particularly true when the research involves very large samples, since (in general) the larger the sample, the easier it is to detect even small differences between groups. For example, say the average pass-rate on a state high school exit exam was 82.3% in 2009 and 82.6% in 2010. Because tens of thousands of high school seniors take the exam each year, the 0.3 percentage-point increase turns out to be statistically significant. However, as policymakers or simply consumers of information, we must interpret the results in a larger context. As yourself, is 0.4 percentage points a meaningful increase from the previous year? Maybe it is, maybe it isn't—but it is critical that we ask the question.

6. Graph scales are manipulated to make differences look more (or less) dramatic. The scale of graph can be manipulated to make small group differences look dramatic (or, conversely, to minimize the impact of larger differences). For example, school district data for math scores of 90%, 93%, 95%, 96% and 98% can presented in two ways:
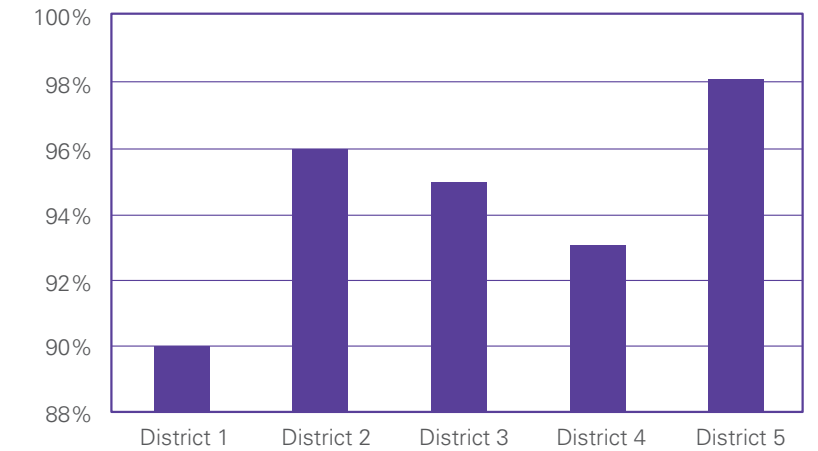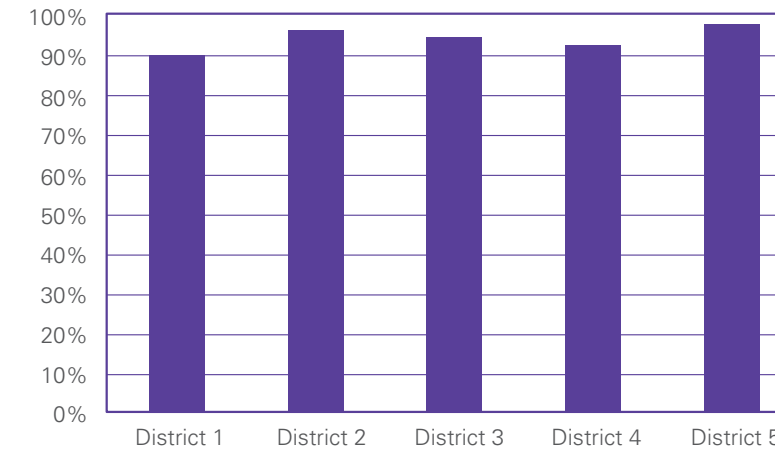
The two graphs may have very different visual impacts and thus convey two different messages. Be mindful of scale when interpreting graphical data, and when constructing graphs, use scales that are reasonable and appropriate for the data points.

7. The data source is ignored. We are constantly bombarded with data in our everyday lives – on television, in newspapers, even advertisements on buses and billboards. To be informed consumers of data, we must equally constantly ask ourselves, "Where did that information come from?" Whether it's a radio commercial stating that "four out of five dentists choose" a particular toothpaste brand or the President's State of the Union address lamenting that 19.7% of children in the United States live in poverty, it is critical to consider the data source when making judgments about numbers. Who originally generated the data? A polling organization? University researcher? Pharmaceutical company? Think about the reason(s) why that particular entity might be conducting the research. Additionally, who is reporting the data? A national newspaper? Peer-reviewed academic journal? What about a political action committee-funded campaign ad? Think about the motivation different entities have for bringing the data into the public eye, as well as any professional or ethical standards to which that entity may or may not be bound. Make an effort to examine original sources, where possible.

Important resources for data on Virginia's children

Voices for Virginia's Children
www.vakids.org

Virginia's KIDS COUNT Data Center
http://datacenter.kidscount.org/va

Virginia Division of Health Statistics
www.vdh.state.va.us/healthstats/

Virginia Department of Education
www.doe.virginia.gov/statistics_reports/index.shtml

Virginia Department of Social Services
www.dss.virginia.gov/geninfo/reports/

County Health Rankings
www.countyhealthrankings.org/virginia

United States Census Bureau
www.factfinder.census.gov

Child Trends Data Bank
www.childtrendsdatabank.org

Population Reference Bureau
www.prb.org

National Center for Children in Poverty
www.nccp.org

13.9% of Virginia children live in poverty.

About Voices for Virginia's Children

Voices for Virginia's Children is a statewide, nonpartisan research and advocacy organization that champions public policies to improve the lives of Virginia's children. We are the independent voice advocating for children, especially those who are disadvantaged or otherwise vulnerable and who often go unheard in the public policy arena. Using our KIDS COUNT system, we track multiple indicators of the well-being of Virginia's children and use that information to identify unmet needs and guide policy recommendations. Through independent, nonpartisan research, data-based policy solutions and vigorous advocacy, we inspire Virginia's leaders and citizens to make children a higher public policy priority.

You can learn more about Voices and how to support our work at **www.vakids.org**.