Youth Risk Behavior Survey (YRBS)

Interpretation Of YRBS Trend Data

Where can I get more information? Visit www.cdc.gov/healthyyouth or call 800–CDC–INFO (800–232–4636).

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
Division of Adolescent and School Health

Summary

The Youth Risk Behavior Survey (YRBS) trend fact sheets provide information about whether the percentage of high school students who are engaging in specific health risk behaviors is increasing, decreasing, or staying the same over time. YRBS data are collected from a sample of the population of students in each jurisdiction. Consequently, it is not possible to determine whether the percentage of students who have engaged in a particular risk behavior has actually changed over time by simply looking at the prevalence estimates for each year on the trend fact sheets. The best way to determine whether an actual change has occurred over time is to conduct a statistical test that takes into account the YRBS sample design, changes in population characteristics over time, and all possible data points in each trend line.

The Centers for Disease Control and Prevention (CDC) has conducted appropriate statistical tests to determine whether changes have actually occurred in the prevalence of specific health risk behaviors since 1991 and between 2007 and 2009. Any changes detected by these tests are indicated in the last two columns of the trend fact sheets. Although two or more prevalence estimates are not exactly the same or look different, statistical tests must be used to determine if the prevalence estimates are actually different. Unless a change is indicated in the final two columns of the fact sheets, do not assume a change has occurred. If you are interested in changes during a different time period than the ones presented in these fact sheets (e.g., 2001–2009), additional statistical tests would need to be conducted.

Why Percent Change Is Not A Good Test Of Difference

It is not possible to determine if two prevalence estimates based on a sample of the population are different or represent an actual trend by calculating percent change. Percent change is strongly dependent on the prevalence estimate's magnitude. Therefore, using the percent change can be misleading, especially if the absolute difference in the prevalence estimates is not presented in conjunction with the percent change. For example, consider these two scenarios:

> Scenario 1: 1% of students used XYZ drug in 2007 and 2% did so in 2009. The absolute difference during the 2-year period is 1% (2%-1%=1%). The percent increase is 100% {[(2-1)/1]*100%=100%}.
>
> Scenario 2: 47% of students used XYZ drug in 2007 and 48% did so in 2009. The absolute difference during the 2-year period is 1% (48%-47%=1%). The percent increase is {[(48-47)/47]*100%=2%}.

In both scenarios, the absolute difference is 1%. However, the percent increase is 100% in Scenario 1 but only 2% in Scenario 2. Clearly, using percent change alone to describe

differences can be very misleading if the magnitude of the prevalence estimates is not simultaneously considered. Further, percent change calculations do not take into consideration changes in population characteristics (e.g., differences in racial/ethnic distributions).

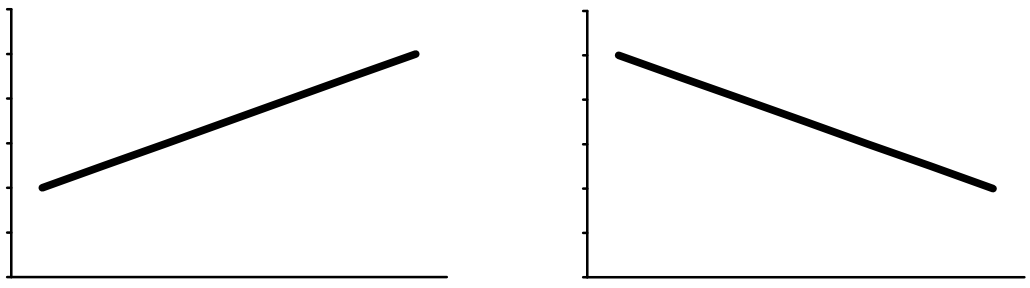
What Statistical Tests Provide An Appropriate Test Of Difference Or Trends Over Time

To accurately determine if two prevalence estimates based on a sample of the population are different, or represent a trend, a statistical test must be used. For example, a simple and conservative statistical test involves examining 95% confidence intervals. If two confidence intervals do not overlap, then the prevalence estimates can be considered statistically different. This method of testing for difference will only detect large differences between two prevalence estimates. A more sophisticated statistical test that CDC uses to analyze YRBS data is a t-test. A t-test can detect smaller differences between two prevalence estimates than examining confidence intervals.

If there are more than two prevalence estimates (as occurs when the same behavior is measured over time), logistic regression analyses (or similar analyses) consider *all* data points (not just the starting and ending prevalence estimates) and simultaneously adjust for changes in underlying population characteristics such as gender, age, or race/ethnicity. These adjustments are necessary if many years of data are being examined. A logistic regression analysis is the most effective test for determining if a statistically significant change has occurred across more than two prevalence estimates.

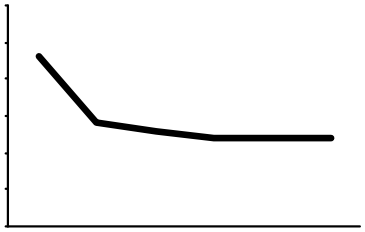
CDC analyzes long-term trends in risk behaviors using logistic regression analyses that assess linear and quadratic trends simultaneously and control for changes in sex, race/ethnicity, and grade in the population during the same time period. Linear trends indicate a statistically significant increase or decrease during the entire time period. Quadratic trends indicate a statistically significant but nonlinear trend in the data over time (e.g., a leveling off or change in direction). The following pictures illustrate how linear and quadratic trends are interpreted.

Statistically significant linear trend means the prevalence estimates either increased (A) or decreased (B) over time. A graph of the prevalence estimates will create a relatively straight line.



A **B**

Statistically significant linear and quadratic trends mean that while there was an overall statistically significant linear increase or decrease in the prevalence estimates over time, the prevalence estimates have either leveled off (if they were first increasing or decreasing) or begun to increase or decrease (after being level). A graph of the prevalence estimates will create a line with a bend in it.



How To Interpret The YRBS Trend Fact Sheets

The YRBS trend fact sheet column titled "Changes from 1991–2009" describes statistically significant linear and quadratic changes over time from 1991 (or the first year in which the data were collected) through 2009 based on logistic regression analyses for each selected behavior. If there is not a statistically significant linear trend then this situation is described as "No change, 1991–2009." If there is a statistically significant quadratic trend, both parts of the quadratic trend are described. For example, "Decreased, 1991–1999 and No change, 1999–2009."

In YRBS trend fact sheets, most statistically significant quadratic trends are accompanied by a statistically significant linear trend. This linear trend is not described, but can be assumed from the description provided for the statistically significant quadratic trend. For example, "Decreased, 1991–1999 and No change, 1999–2009," usually implies a statistically significant linear decrease from 1991–2009. If you are interested in whether a statistically significant linear or quadratic change occurred during a different period of time (e.g., 2001–2009) than is presented in the YRBS fact sheets, additional statistical tests must be conducted. It is NOT possible to determine if a statistically significant trend exists by simply looking at the prevalence estimates.

The YRBS trend fact sheet column titled "Change from 2007–2009" describes whether the 2007 and 2009 prevalence estimates for each selected behavior are statistically different based on t-test analyses. If there is not a statistically significant difference, then this situation is described as "No change." If you are interested in whether any other two prevalence estimates (besides the 2007 and 2009 estimates) are different, a new statistical test must be conducted. It is NOT possible to determine if two estimates are statistically different by simply looking at them.

Why Public Health Significance Also Should Be Considered

Statistically significant differences or trends do not necessarily have public health or "real world" significance. Because statistically significant differences or trends are partly a function of sample size (the larger the sample, the smaller the change that can be detected), they may not be big enough to merit public policy consideration. Nonetheless, statistically significant differences or trends should be considered as at least a minimum starting point for any discussion about differences or changes over time.