Youth Risk Behavior Surveillance System (YRBSS)

Interpretation of YRBS Trend Data

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

National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
Division of Adolescent and School Health

Introduction

Purpose

The purpose of this document is to provide background and to describe how to interpret the results of the trend analyses conducted for the YRBS Trend Fact Sheets.

Contents

Other Resources

Readers unfamiliar with YRBS data should review:

- the latest national data documentation,
- Methodology of the Youth Risk Behavior Surveillance System—2013,
- Software for Analysis of YRBS Data,
- Combining YRBS Data Across Years and Sites,
- Conducting Trend Analyses of YRBS Data, and
- the Frequently Asked Questions page on the YRBS website.

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 2013 and 2015. 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., 2003–2015), additional statistical tests would need to be conducted.

Why Percent Change Is Not A Good Test Of Difference

Introduction

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.

Two Scenarios

For example, consider these two scenarios:

> Scenario 1: 1% of students used XYZ drug in 2013 and 2% did so in 2015. 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 2013 and 48% did so in 2015. 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

Introduction

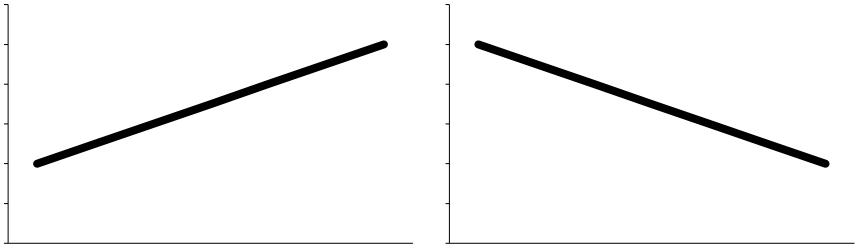
To accurately determine if prevalence estimates based on a sample of the population are different, or represent a trend, it is not enough to compare only the prevalence estimates. One must also consider the variance of each prevalence estimate. For example, a simple and conservative test that considers the prevalence estimate and the variance involves examining 95% confidence intervals. A good rule of thumb is that if two confidence intervals do not overlap, then the prevalence estimates can be considered statistically different. A more sophisticated statistical test that CDC uses to analyze YRBS data is a t-test. A t-test is a more accurate way to compare 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 sex, age, or race/ethnicity. These adjustments are necessary if many years of data are being examined. Logistic regression analysis is the most effective way to determine 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 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

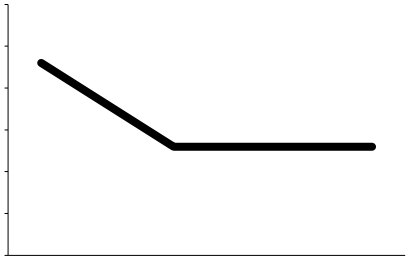
Statistically significant linear trend means the prevalence estimates either increased (A) or decreased (B) over time. A graph of the prevalence estimates will create a relatively straight line.



A **B**

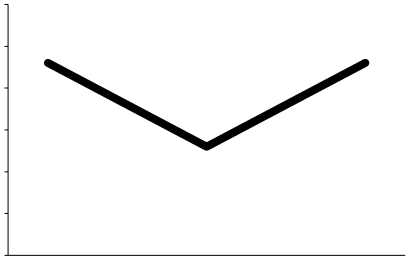
Statistically Significant Linear and Quadratic Trends

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.



Statistically Significant Quadratic Only Trends

Statistically significant quadratic only trends mean that while there was no overall statistically significant linear increase or decrease in the prevalence estimates over the full time period, the prevalence estimates have changed direction (either increasing then decreasing, or decreasing then increasing) by approximately the same amount. A graph of the prevalence estimates will create a line with a bend in it.



How To Interpret The YRBS Trend Fact Sheets

Long-term Change

The YRBS trend fact sheet column titled "Long-term Change" describes statistically significant linear and quadratic changes over time from 1991 (or the first year in which the data were collected) through 2015 based on logistic regression analyses for each selected behavior. If there is a statistically significant linear trend then this situation is described as "Increased, 1991–2015" or "Decreased, 1991-2015." If there is a statistically significant quadratic trend, both parts of the quadratic trend are described. For example, "Decreased, 1991–1999 and No change, 1999–2015." If there is no statistically significant linear or quadratic trend then this situation is described as "No change, 1991–2015." If you are interested in whether a statistically significant linear or quadratic change occurred during a different period of time (e.g., 2001-2015) than is represented 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.

Change from 2013-2015

The YRBS trend fact sheet column titled "Change from 2013–2015" describes whether the 2013 and 2015 prevalence estimates for each selected behavior are statistically different based on t-test analyses. If there is a statistically significant difference, then this situation is described as "Increased" or "Decreased." 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 2013 and 2015 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

Public Health Significance

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), the differences 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.