fact sheet

Colorado Behavioral Risk Factor Surveillance System (BRFSS) 2011 Methodological Improvements: Incorporation of Cell Phones and Raking Weights

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Introduction

The Behavioral Risk Factor Surveillance System (BRFSS) is a statewide health survey developed by the Centers for Disease Control and Prevention (CDC) and conducted by individual states and U.S. territories. Colorado BRFSS data are used extensively to monitor lifestyle and behaviors related to chronic health conditions and leading causes of death across the state. In 2011, BRFSS introduced two changes to the survey methodology in order to reduce bias and more accurately reflect population data. The two survey improvements are the addition of cell phone interviews and a weighting method called raking.

Traditionally, the BRFSS only administered surveys to households who had landline telephones. In recent years, cell phone use has continued to steadily increase across the nation while the number of U.S. households that have a landline telephone is rapidly decreasing.[1]

The inclusion of cell phone data requires a new weighting methodology to accurately represent and adjust the sampling method. Prior to the addition of cell phones to the sample, the BRFSS used a statistical method called post-stratification to weight the survey data to reflect the state population. In 2011, a new weighting method called iterative proportional fitting (or raking) was introduced. Raking adjusts the sample using more detailed socio-demographic characteristics and allows for the inclusion of the cell phone sample. Adjustment factors for each weighting method are as follows:

Post-Stratification (prior to 2011)	Raking (2011 and beyond)
• Age • Gender • Race/ethnicity	• Age group by gender • Detailed Race/ethnicity • Educational level • Marital status • Home owner or rental status • Gender by race/ethnicity • Age group by race/ethnicity • Telephone source

Why the change now?

BRFSS continues to strive to provide and maintain estimates that represent each state's population. With the large increase in use of cellular phones, BRFSS must incorporate cell phone users to accurately represent the population. The addition of cell phone users and weighting the data through raking will provide more representative estimates of the Colorado adult population.

Impact of the new methods in Colorado

The effect of adding cell phones accounts for the increasing number of households without a landline phone. Adding cell phone users to the sample and adjusting for more socio-demographic factors helps Colorado better account for the under-representation of males, adults with less formal education, lower income households, young adults, and racial/ethnic minorities. Since more socio-demographic factors are being used to weight the data to represent

References

1. Blumberg SJ, Luke JV. Wireless substitution: Early release estimates from the National Health Interview Survey, January-June 2011. Available at http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201112.pdf Accessed April 30, 2012.

2. Carol Pierannunzi, PhD, Machell Town, MS, William Garvin, Frederick E. Shaw, MD, JD, Lina Balluz, ScD, Div of Behavioral Surveillance, Office of Surveillance, Epidemiology and Laboratory Svcs, CDC. MMWR / June 8, 2012 / Vol. 61 / No. 22 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6122a3.htm?s_cid=mm6122a3_w Accessed June 8, 2012

Additional Information

Visit the Colorado Department of Public Health and Environment's Colorado Health and Environment Data web site http://www.chd.dphe.state.co.us/default.aspx

Call the Health Statistics Section at the Colorado Department of Public Health and Environment (303)692-2160

Colorado's population, stakeholders should expect prevalence estimates will be affected by those who are usually at risk for a particular indicator.

Preliminary analyses of Colorado data indicate very little significant change in estimates when comparing 2010 post-stratified estimates to 2011 raked estimates, with the exception of binge drinking (Table 1). Significant differences are defined as nonoverlapping confidence intervals.

Table 1: Comparison of 2010 Post-stratified Estimates vs. 2011 Raked Estimates for Selected Health Indicators, Colorado, BRFSS

Indicator	2010 Post-stratified Estimate (95% CI)	2011 Raked Estimate (95% CI)
Health Insurance Coverage	83.6 (82.2-85.0)	82.1 (80.9-83.3)
Diabetes	6.0 (5.4-6.6)	6.7 (6.1-7.3)
Current Asthma	9.2 (8.4-10.1)	8.3 (7.7-8.9)
General Health (reported as good or better)	87.7 (86.9-88.5)	86.2 (85.2-87.2)
Leisure Time Physical Activity	81.8 (80.6-83.0)	83.5 (82.5-84.5)
Current Smoking	16.0 (14.8-17.2)	18.3 (17.3-19.3)
Under- and Normal BMI*	42.4 (40.8-44.0)	43.9 (42.6-45.1)
Overweight BMI*	36.2 (34.8-37.6)	35.4 (34.2-36.6)
Obese BMI*	21.4 (20.2-22.6)	20.7 (19.7-21.7)
Overweight or Obese BMI*	57.6 (55.0-60.2)	56.1 (54.9-57.4)
Binge Drinking	15.4 (14.2-16.6)	**20.1 (18.9-21.3)**

*BMI = Body Mass Index

Interpretation of prevalence estimate changes – what does a higher or lower estimate mean?

Increases or decreases in prevalence estimates from 2010 to 2011 may be of concern for certain programs and stakeholders. BRFSS users will need to evaluate whether the differences in prevalence estimates between 2010 and 2011 represent meaningful differences for their program efforts. There is a risk of misinterpretation of the changes from 2010 and 2011 as "real change" instead of changes as a result of adding cell phones and new weighting methodology. It is difficult to predict or determine long-term trends by comparing an estimate from one year to the next. Some increases in prevalence estimates seen in 2011 may be expected because the prevalence of these selected indicators are common among the socio-demographic groups which the addition of cell phones aimed to capture. For example, the increase in the prevalence of current smokers is expected as more cell phone users tend to be adults who are younger, male, have less formal education, and identify themselves as racial/ethnic minorities. Time-trend graphs will have to incorporate a break in trend starting in 2011. When comparing post-stratified estimates to raked estimates, the true differences in estimates over time are not discernible. Given the change in methods, such comparisons will be especially difficult to make when comparing 2010 and 2011 estimates.

Next steps

The Health Statistics Section of the Colorado Department of Public Health and Environment (CDPHE) in conjunction with the CDC will continue to monitor the impact of the addition of cell phone users and raking. The CDC has prepared an MMWR article published on June 8, 2012 to further describe the rationale and details of the changes in methodology.[2] In addition, the Health Statistics Section is evaluating the effects introduced in 2011 and preparing supporting documents and information on expected changes in our state's prevalence estimates.