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## Unused Medication Disposal in Colorado: Results from the Behavioral Risk Factor Surveillance System

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### Introduction

When over-the-counter or prescription medications are no longer needed, they should be removed from the home. Unused medications can fall into the hands of small children and cause accidental poisoning. More than one million children under the age of five are treated each year in the United States for poisoning caused by household chemicals and medications. Older children and teens may be tempted to experiment with easily available medications, causing harm to themselves or their friends. Nationally, 1 in 5 teens has reported abusing prescription drugs that were not prescribed to them.

Medication disposal should be done in a manner that minimizes the chance of misuse and also protects the environment. Flushing medications down the toilet or throwing them in the trash can cause pollution of lakes, streams and water supplies. Medications collected under Colorado's medication disposal project will dispose of collected medications by hazardous waste incineration, offering the highest degree of environmental protection.

During calendar year 2009, a question was added to the Colorado Behavioral Risk Factor Surveillance System (BRFSS) to determine the ways in which Colorado residents dispose of unused medications. Subsequently a medication take-back program, administered by the Colorado Department of Public Health and Environment, was launched at the end of 2009. The program was designed to provide a resource for the removal of waste medications from the public and provide appropriate disposal measures. The addition of the medication disposal question to the BRFSS was intended to establish baseline information on medication disposal habits and explore differences by population characteristics and/or geographic location in the state. This report summarizes the existing disposal methods used and the regional differences identified.

### Methodology

The Colorado BRFSS is an ongoing health survey of Colorado adults ages 18 years and older. A total of 11,956 adults were interviewed in 2009. All households with landline telephones

had a chance of being selected to participate in the survey, with individual survey respondents being randomly selected from each successfully contacted household.

The 2009 Colorado BFRSS asked one question designed to measure the means by which respondents disposed of unused medication. The question did not differentiate between over-the-counter, prescription and controlled medication and was based on three primary disposal methods: flushing them down the toilet, throwing them in the trash, or taking them to a special medication collection site. Respondents also had the option to answer either that they don't take medicine, don't know/are unsure or to refuse to answer the question.

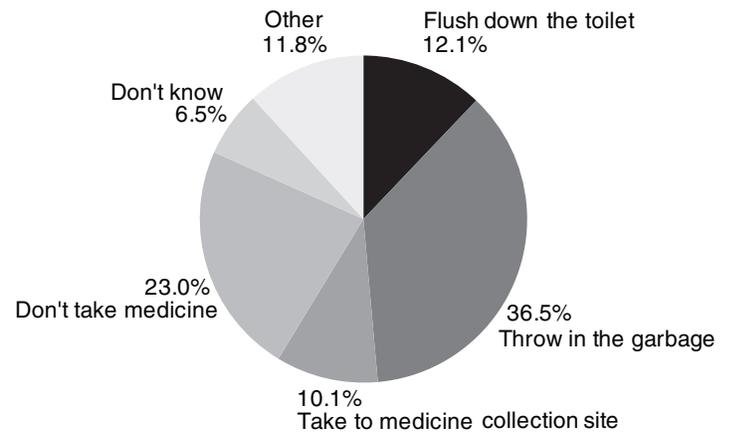
The unused medication disposal question was asked of approximately one-half of the sample, for a total of 5,971 completed interviews. Variables were tested to determine if significant differences existed between the responses for various groups. Ninety-five percent confidence intervals (CIs) were calculated and significance was determined by examining overlap of the CIs between the prevalence estimates. Data were analyzed using the statistical analysis software SAS version 9.2.

## Results

### Unused Medication Disposal

Figure 1 shows that in 2009, 10.1 percent of Coloradans disposed of their unused medication at a medication take-back site. The data also indicate that 36.5 percent of Coloradans throw their unused medication in the trash and 12.1 percent of respondents flush their unused medication down the toilet. Responses also included 11.8 percent of those taking medication disposing of unused medicine in some other way including dispersing it in kitty litter as recommended by the Food and Drug Administration (FDA).

**Figure 1: Unused medication disposal method, Colorado BRFSS, 2009**



Source: 2009 Behavioral Risk Factor Surveillance System (BRFSS), Health Statistics Section, Colorado Department of Public Health and Environment.

### Regionality

Table 1 reports medication disposal methods within Health Statistics Regions. Health Statistics Regions are aggregations of counties developed with the Colorado Department of Public Health and Environment Health Statistics Section in partnership with state and local public health professionals using statistical and demographic criteria (<http://www.cdph.state.co.us/hs/regionaldata/regionaldata.html>). The data in Table 1 only include the responses from those who take medication. Overall, approximately 16 percent of Coloradans who take medication flush them down the toilet, 45 percent throw them in the trash and 13 percent take them to a medication collection site. Colorado's rural communities appear to utilize medical collection sites less than those near population centers. This may be a reflection of better availability of medication collection sites in urban areas.

**Table 1. Unused medication disposal Health Statistics Regions results: Colorado BRFSS, 2009**

How do you dispose of your expired or unused medications? Do you...

	Flush down toilet			Throw in trash			Take to special medical collection site		
	Percent	95% CI*		Percent	95% CI		Percent	95% CI	
		Low	High		Low	High		Low	High
Colorado	15.7	14.2	17.2	47.4	44.9	49.9	13.1	11.7	14.5
Region 1	24.9	16.5	33.2	48.5	39.0	58.0	7.9	3.0	12.7
Region 2	13.9	8.6	19.2	52.3	44.3	60.4	13.6	8.1	19.2
Region 3	16.5	9.6	23.3	51.0	37.2	64.8	6.7	2.7	10.6
Region 4	15.7	11.1	20.2	40.0	33.3	46.8	19.0	13.5	24.4
Region 5	21.6	12.7	30.6	49.6	38.2	60.9	15.8	8.5	23.0
Region 6	21.6	13.0	30.1	43.9	31.6	56.2	13.9	6.4	21.4
Region 7	21.7	9.4	34.0	40.4	27.2	53.6	15.3	8.6	22.0
Region 8	25.8	15.5	36.2	40.9	29.1	52.6	6.3	1.6	11.0
Region 9	10.7	5.4	16.0	55.1	42.6	67.6	6.7	2.4	11.1
Region 10	15.6	7.8	23.4	54.6	41.2	67.9	6.0	0.4	11.6
Region 11	21.6	13.9	29.4	54.5	44.7	64.3	8.6	2.2	15.1
Region 12	8.3	2.6	14.0	60.1	49.5	70.7	7.0	1.4	12.6
Region 13	29.3	14.7	44.0	37.6	25.7	49.6	7.3	2.0	12.6
Region 14	17.2	12.1	22.3	41.4	34.7	48.1	15.6	11.1	20.1
Region 15	14.0	9.8	18.3	53.7	45.4	62.0	11.0	7.1	14.9
Region 16	8.5	4.5	12.5	43.1	33.3	52.9	20.0	13.5	26.5
Region 17	12.9	6.2	19.7	45.1	34.8	55.5	15.6	8.6	22.5
Region 18	23.2	12.6	33.9	49.1	38.4	59.8	7.6	3.6	11.7
Region 19	18.0	8.7	27.4	52.3	40.7	64.0	8.4	1.5	15.2
Region 20	13.5	8.9	18.0	51.3	43.2	59.4	14.2	8.9	19.4
Region 21	15.9	11.6	20.2	42.5	35.1	50.0	14.3	9.9	18.7

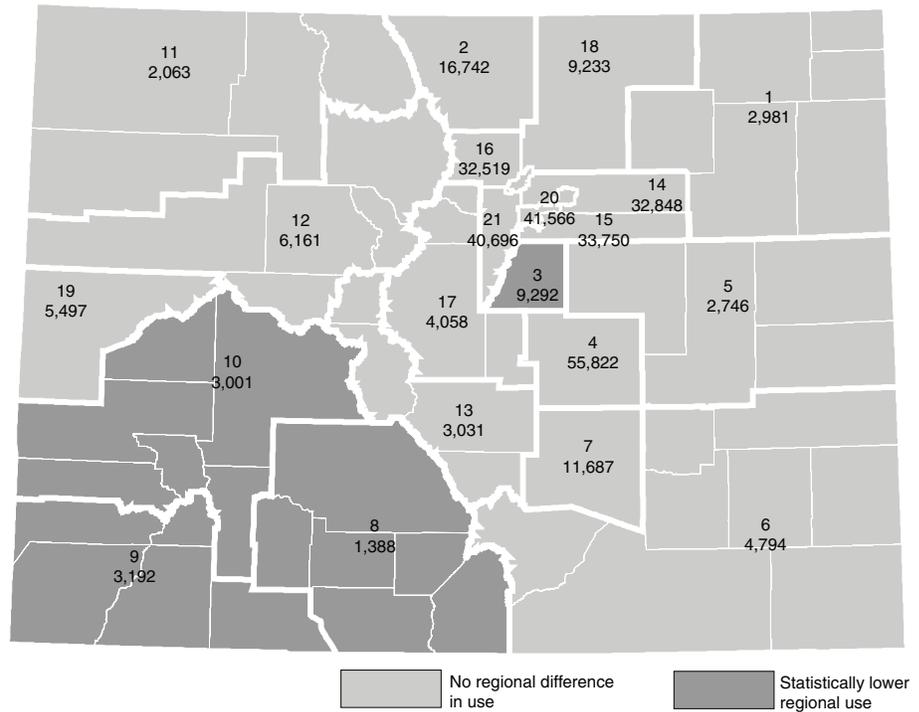
\* Confidence Interval

Region 1: Logan, Morgan, Phillips, Sedgwick, Washington, Yuma Region 2: Larimer Region 3: Douglas Region 4: El Paso Region 5: Cheyenne, Elbert, Kit Carson, Lincoln Region 6: Baca, Bent, Crowley, Huerfano, Kiowa, Las Animas, Otero, Prowers Region 7: Pueblo Region 8: Alamosa, Conejos, Costilla, Mineral, Rio Grande, Saguache Region 9: Archuleta, Dolores, La Plata, Montezuma, and San Juan Region 10: Delta, Gunnison, Hinsdale, Montrose, Ouray, San Miguel Region 11: Jackson, Moffat, Rio Blanco, Routt Region 12: Eagle, Garfield, Grand, Pitkin, Summit Region 13: Chaffee, Custer, Fremont, Lake Region 14: Adams Region 15: Arapahoe Region 16: Boulder, Broomfield Region 17: Clear Creek, Gilpin, Park, Teller Region 18: Weld Region 19: Mesa Region 20: Denver Region 21: Jefferson

Source: 2009 Behavioral Risk Factor Surveillance System (BRFSS), Health Statistics Section, Colorado Department of Public Health and Environment

Figure 2 shows the Health Statistics Regions' relationships to the weighted state average for respondents that take unused medication to a special collection site. The data are displayed as being statistically the same as, or lower than the state average. No Health Statistics Region was statistically higher than the weighted state average. Respondents from regions 3, 8, 9, and 10 all used medication collection facilities at a statistically lower rate than the state weighted average of 13.1 percent.

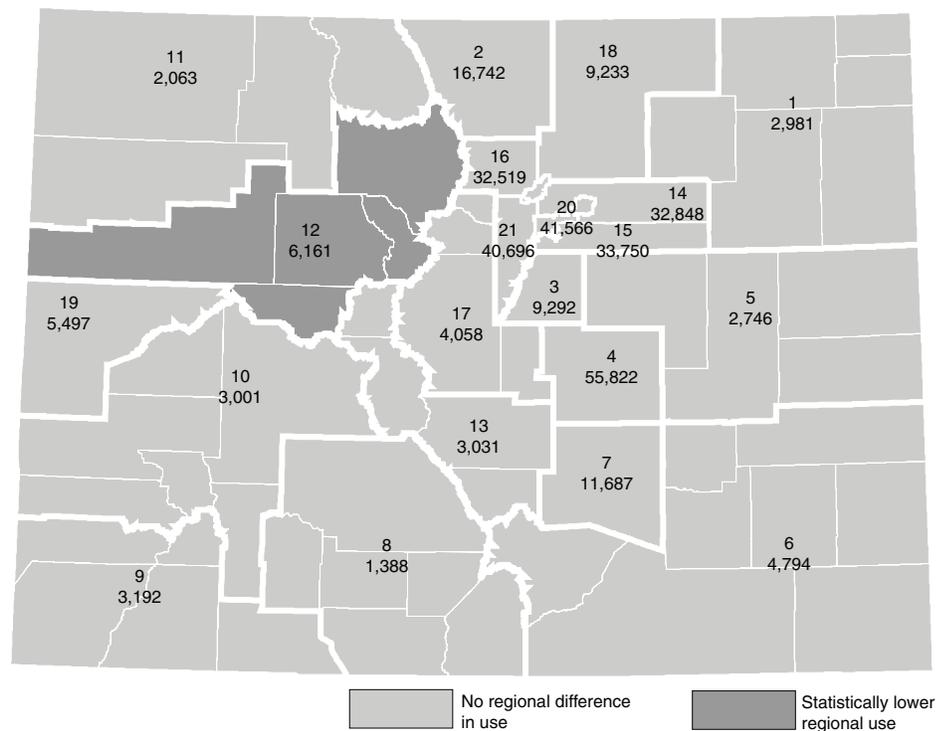
**Figure 2. Coloradans that reported taking their unused medication to a special collection facility: Colorado BRFSS, 2009**



Source: 2009 Behavioral Risk Factor Surveillance System (BRFSS), Health Statistics Section, Colorado Department of Public Health and Environment.  
 Note: Top number denotes Health Statistics Region; Bottom number denotes weighted adult population.

Figure 3 shows survey results that identified flushing unused medication down the toilet as the preferred means. The data are displayed as being statistically the same as, or lower than the state average. There were no responses indicating a higher rate of flushing unused medication down the toilet from any region. Respondents from region 12 were less likely to flush medication down the toilet. Survey results from the rest of the state showed no difference from the state average for disposing of unused medication in the toilet.

**Figure 3. Coloradans that reported flushing their unused medication down the toilet: Colorado BRFSS, 2009**



Source: 2009 Behavioral Risk Factor Surveillance System (BRFSS), Health Statistics Section, Colorado Department of Public Health and Environment.  
 Note: Top number denotes Health Statistics Region; Bottom number denotes weighted adult population.

## Demographics

There were no statistically significant differences on the unused medication disposal measure based on education, race, ethnicity or income. There are a few observable differences in age and employment status. Survey results from those over 70 years of age showed this group was less likely to throw unused medication in the trash. Those reporting they were unable to work also reported that they were less likely to throw medication in the trash and that they were more likely to take unused medication to a medication collection site (Table 2).

**Table 2. Unused medication disposal demographic results: Colorado BRFSS, 2009**

	Flush down toilet				Throw in trash				Take to special medical collection site			
	Weighted Population Estimate	95% CI*			Weighted Population Estimate	95% CI			Weighted Population Estimate	95% CI		
		Percent	Low	High		Percent	Low	High		Percent	Low	High
All adults	387,590	15.7	14.2	17.2	1,169,285	47.4	44.9	49.9	323,064	13.1	11.7	14.5
<b>Age group</b>												
18-29	43,449	10.0	5.1	14.9	235,282	54.3	44.3	64.4	33,136	7.7	3.5	11.8
30-49	165,534	16.7	14.2	19.1	513,748	51.7	48.3	55.1	118,576	11.9	9.7	14.2
50-69	134,248	17.5	15.4	19.6	335,087	43.6	40.7	46.5	119,586	15.6	13.5	17.7
70+	4,201	14.4	5.8	23.1	8,147	28.0	18.0	38.0	6,570	22.6	12.3	32.9
<b>Sex</b>												
Male	145,245	12.5	10.5	14.6	545,377	47.1	43.3	50.8	155,426	13.4	11.1	15.7
Female	242,345	18.5	16.3	20.8	623,908	47.7	44.4	51.0	167,639	12.8	11.1	14.6
<b>Race and Ethnicity</b>												
White	308,017	15.8	14.1	17.4	897,713	46.0	43.4	48.5	268,871	13.8	0.0	13.9
Black	15,051	19.6	7.4	31.9	46,754	61.0	42.3	79.8	4,969	6.5	1.6	18.4
Hispanic	383,229	16.1	11.2	20.9	181,454	54.4	47.1	61.7	36,806	11.0	7.2	14.9
<b>Education</b>												
< HS	27,767	17.5	10.5	24.6	75,385	47.6	36.9	58.4	22,450	14.2	7.0	21.4
HS diploma	99,376	17.1	13.3	20.9	259,400	44.6	38.9	50.4	62,999	10.8	8.2	13.5
Some college	105,684	15.9	13.0	18.8	307,911	46.3	41.0	51.6	85,951	12.9	10.2	15.7
College graduate	153,471	14.5	12.5	16.5	526,589	49.8	46.8	52.8	150,652	14.2	12.1	16.4
<b>Income</b>												
<\$15,000	27,116	18.0	9.7	26.3	59,024	39.2	26.9	51.4	17,609	11.7	5.2	18.2
\$15,000-\$24,999	42,568	17.9	13.6	22.2	103,958	43.8	37.0	50.6	34,575	14.6	10.2	18.9
\$25,000-\$34,999	27,989	15.7	10.1	21.4	87,697	49.3	38.4	60.2	27,811	15.6	10.1	21.2
\$35,000-\$49,999	45,412	14.9	11.2	18.6	139,522	45.7	38.6	52.8	42,650	14.0	10.0	17.9
\$50,000+	206,736	15.6	13.5	17.6	679,999	51.3	48.3	54.3	171,080	12.9	11.0	14.8
<b>Employment status</b>												
Employed	232,545	16.0	14.0	18.0	735,020	50.7	47.7	53.7	176,591	12.2	10.3	14.0
Unemployed	33,947	15.7	8.8	22.7	87,603	40.6	29.1	52.1	18,649	8.6	3.6	13.7
Retired/student/ homemaker	41,508	12.3	8.0	16.6	190,143	56.3	48.4	64.3	33,972	10.1	6.0	14.1
Unable to work	15,926	18.6	12.2	25.0	24,837	29.0	20.6	37.4	21,700	25.3	17.5	33.1

Source: 2009 Behavioral Risk Factor Surveillance System (BRFSS), Health Statistics Section, Colorado Department of Public Health and Environment.

## Discussion

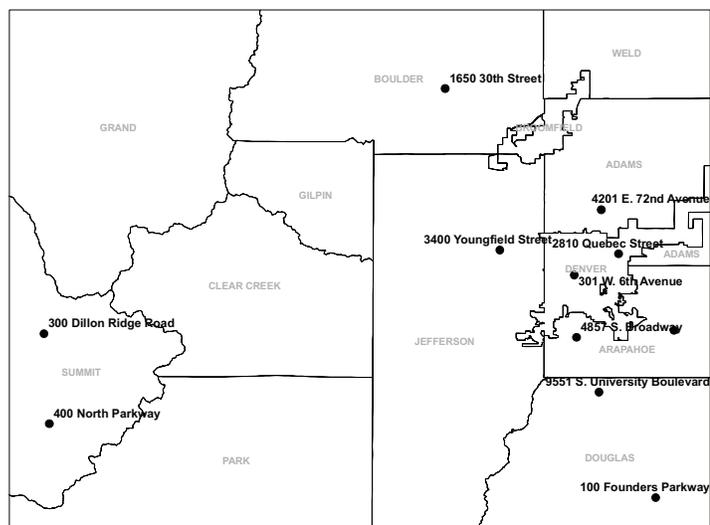
Starting in December 2009, the Colorado Department of Public Health and Environment, in collaboration with a number of project partners, kicked off a Medication Take-Back Pilot Project to provide the public an alternative to flushing or disposing of unused medications in ways that impact public health and the environment.

Colorado's concern with the use and disposal of medications stems from scientific reports that document trace amounts of pharmaceuticals in wastewater treatment plant effluents, waterways and treated drinking water supplies. Even in trace amounts, pharmaceuticals in the environment may have potential consequences to ecosystems and human health. While ongoing research and strategy development will likely lead to

long-term control mechanisms, interim measures, such as Colorado's pilot project, will help reduce the presence of pharmaceuticals in the environment. In addition, by providing a safe collection method for the public, the likelihood of accidental poisoning and intentional misuse of accumulated household medications can be significantly reduced.

The Colorado Medication Take-Back Pilot Project provides a network of secure drop boxes located at 6 Front Range King Soopers, 2 Summit County City Markets, Tri-County Health Department offices in Commerce City and Englewood and the Denver Health main campus (See Figure 5). For more information on the Colorado Medication Take-Back Pilot Project please visit <http://www.cdphe.state.co.us/hm/medtakeback/index.htm>.

Figure 4. Colorado medication take-back locations



Results of the program are forthcoming but through October 31, 2010 include 120 collections totaling 6,055 pounds of unused medication. As has been stated, the 2009 data will be used as a base line. The Colorado Department of Public Health and Environment plans to ask this question in subsequent years to help evaluate the effectiveness of the medication take-back program.