

## PUBLIC PERCEPTION OF RADON IN COLORADO

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The Radiation Control Division (Division) of the Colorado Department of Health (Department) has a long history of intensive education efforts concerning the nature and effects of radon gas. Evaluation of these efforts was hindered by the lack of information on existing levels of knowledge, attitudes and behaviors. In order to obtain baseline information, the Division contracted with the Health Statistics Section of the Department to conduct a telephone survey in 1991. Results showed that while most Coloradans (87%) had heard of radon and 76% knew that prolonged exposure can be harmful to health, less than half knew how to test and even fewer (10%) had actually tested. A separate 1992 national survey shows Colorado's awareness levels and mitigation rates about the same, testing increasing 10-13%, with real estate sales-related testing being the prevalent cause of testing. This paper compares the survey results.

Radon mitigation after testing is thought to follow from radon risk awareness. Two surveys of Colorado residents indicate that the linkage of awareness and testing to mitigation cannot be taken for granted in implementing voluntary radon abatement.

### 1991 COLORADO SURVEY

#### History

In 1991, the Survey Research Unit of the Colorado Department of Health, Health Statistics Section conducted a telephone survey to obtain information from a statewide random sampling of Coloradans as to the level of awareness achieved by the Radiation Control Division's intensive education efforts concerning the nature and effects of radon gas. No prior survey data were available since the beginning of the U.S. Environmental Protection Agency (U.S. EPA) Radon Program other than a national testing estimate of 6%.

#### Methodology

From January through April of 1991, questions concerning the public's awareness of radon and the use of radon testing were incorporated into the existing Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS, an ongoing population-based survey, consists of a 10- to 15-minute telephone interview regarding a variety of health practices, such as seat belt use, smoking behavior, and preventive health practices. Fifteen questions related to knowledge, attitudes, and behaviors about radon were added to this survey. Eight of these questions were from the standard module developed by the Behavioral Surveillance Branch, Office of Surveillance and Analysis, Centers for Disease Control; seven questions were developed by the Radiation Control Division and the Health Statistics Section of the Colorado Department of Health. The 15 (sic) radon questions can be found in Appendix A. The survey was administered in Spanish to those respondents who preferred that language.

Using the Waksberg multistage-cluster, random digit dialing sample procedure, adult respondents were randomly selected from among noninstitutionalized Colorado residents aged 18 and over who had telephones. Randomly chosen numbers were called during a two-week period each of the four months. Numbers were discarded if they were non-working or business numbers. Further, numbers were replaced if they could not be reached after 20 attempts during calling periods that included daytime, nighttime, and weekend hours. Each month, 150 interviews were completed.

In order to generalize prevalence estimates based on the answers of those surveyed to the Colorado population as a whole, a number of weighting procedures were used. The probability of selection increases with the number of telephone lines into the household; probability of selection for each adult decreases as the number of eligible adults in the household increases. The data were therefore weighted both for the number of telephone lines and for the number of eligible respondents in the household. The data were also weighted to reflect the age-specific and gender-specific counts from the 1990 Colorado census as well as the proportion of Colorado households that were owner occupied as determined from the 1990 census.

## 1992-93 CRCPD SURVEY

### History

During 1992 and 1993, the Conference of Radiation Control Program Directors, Inc. (CRCPD) was contracted by the U.S. EPA to survey radon awareness throughout the United States. CRCPD's telephone survey was conducted by Bruskin/Goldring Research.

A previous nationwide study revealed that approximately 75% of the population was aware of radon; 6% actually tested for radon and 3% fixed or mitigated their homes as a result of testing.

In this study CRCPD wanted to obtain percentages of the population aware of radon, who have tested for radon and who have mitigated. This was completed on a state-by-state basis for all 50 states in order to establish benchmark data. An additional goal was to compile the data so that state comparisons could be made to national and regional norms. Specific areas of investigation include: awareness of radon; perceptions of health effects; ability to correctly identify the cause of radon; incidence of radon testing (ever tested, past year, as part of real estate transaction); results of testing; mitigation (perceived mitigation and meaningful mitigation); and demographic.

An additional aspect of the CRCPD survey was collection of data for High Radon Areas (HRA) identified by the U.S. EPA.

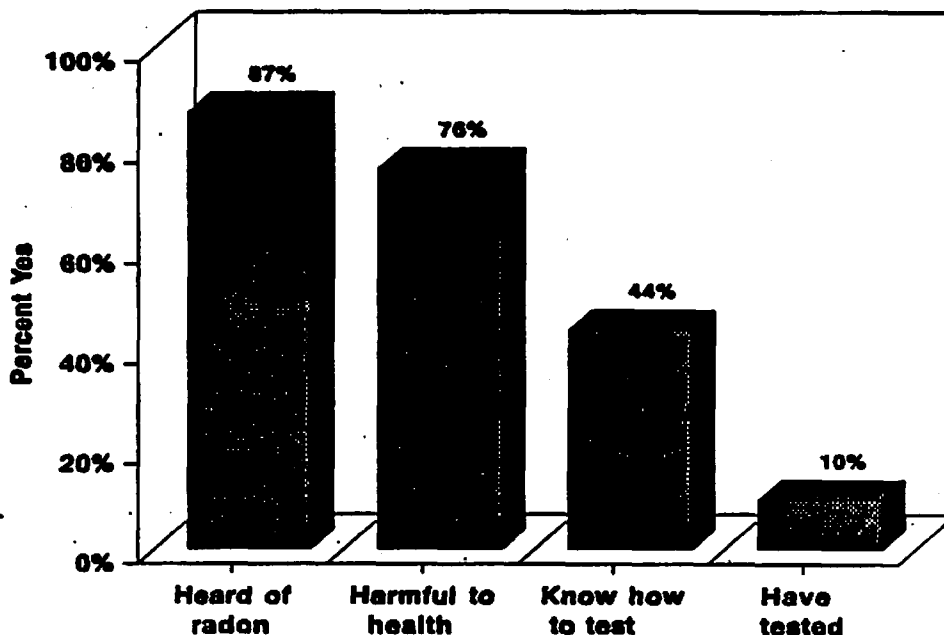
### Methodology

To conduct this study, Bruskin/Goldring utilized their 150+ Computer Assisted Telephone Interviewing (CATT) stations. The sample was built through the Genesis system of random digit dialing (RDD) selection. RDD telephone interviewing obtains a representative sample of telephone households including both unlisted as well as listed numbers of the population within each state.

Respondents included in the survey are residents of the state for which the interview was conducted. All businesses and other public establishments were excluded from participating in the survey. Sample cell sizes were 600 per state and 300 per HRA. Interviewing was conducted October 27, 1992 to January 14, 1993 during evening and weekend hours. In case of busy signals and/or no answers, households were called up to six times. Each state's basic data was weighted by race, age and education using census figures.

## RESULTS OF THE 1991 CDH SURVEY

The 1991 CDH telephone survey found that while most Coloradans (87%) had heard of radon and over three-fourths (76%) knew that prolonged exposure can be harmful to health, less than half (44%) knew how to test for radon and fewer (10%) had actually tested. Very few (5%) said they had taken action to reduce radon levels in some way.



*Figure 1: Radon Knowledge, Attitudes, and Behaviors, CDH Survey*

Whether or not the respondent had heard of radon and knew how to test was significantly related to age with the youngest age group (18-24) the least likely to have heard of the gas. The educational level of the respondent was also significantly related to having heard of radon. Only 65% of those with less than a high school education had heard of the gas compared to 82% of those who had a high school degree and 96% of those with at least some college. At all levels of education, knowing how to test was significantly less prevalent than having heard of radon. Those respondents in the highest income level of more than \$50,000 per year were significantly more likely to have heard of radon than those in the lowest level of less than \$15,000 per year.

Other analyses demonstrated that those who owned their residence were more likely to have heard of radon than those who rent. There were no significant differences based on type of residence or urban/rural location.

## RESULTS OF THE 1992-93 CRCPD SURVEY

The 1992-93 CRCPD survey in Colorado found a slightly increased (6% higher) incidence of testing statewide, with real estate sales-related testing prevalent in 46% of tests done. Awareness was over four-fifths (81%) but mitigation was only about 3%, less than found in the 1991 CDH survey but highest in the United States.

Nationally, two-thirds (67%) of adults are aware of radon gas. While a majority of those aware can correctly identify radon as unhealthy and naturally occurring, relatively few have tested (9% of total population).

Only a small percentage (1%) of those testing positively have mitigated.

The High Radon Areas identified in Colorado include the counties of Adams, Denver, Douglas, El Paso, Jefferson, Kiowa, Mesa, Teller, Washington, and Yuma. Nationally the HRAs show higher rates of awareness, testing, and mitigation. In Colorado, awareness and testing are slightly higher in the HRAs while total number of mitigations remains higher statewide.

#### COMPARISONS OF THE CDH & CRCPD SURVEYS

	CDH 1991	CRCPD 1992-93	CRCPD HRA 1992-93	CRCPD U.S. 1992- 93
Awareness	88%	81%	81%	67%
Perceived as Unhealthy by Those Aware	77%	73%	71%	39%
Ever Tested	10%	16%	19%	9%
Action Taken to Reduce if Elevated	5%	3%	1%	1%

*Table 1*

#### CONCLUSIONS

The degree of recognition of radon as a potential hazard, after intensive education efforts especially in areas of Colorado with higher radon levels, is relatively high compared with the U.S. as a whole. However, the levels of voluntary testing and voluntary mitigation are much lower, from both the CDH 1991 and CRCPD 1992-93 surveys. The focus now needs to be on encouraging testing and remediation versus general radon knowledge if significant improvement in radon abatement is to occur.

The Colorado Department of Health Radiation Control Division does not expect to see dramatic improvements in testing and mitigation in lieu of statutory and/or regulatory requirements for testing and mitigation. Without statutory or regulatory action, a slow upward trend in voluntary radon abatement is expected.

#### REFERENCES

Colorado Department of Health, November 1991, Radon Awareness Survey. Denver, CO: Radiation Control Division. 19 pp.

Bruskin/Goldring Research, February 1993, CRCPD Radon Risk Communication & Results Study. Edison, NJ.

**APPENDIX A**  
**Radon Questions in 1991 CDH Survey**

1. Have you heard of radon which is a radioactive gas that occurs in nature?
2. How did you first hear about radon gas (Newspaper, radio, television, neighbors, friends, other)?
3. Have you read any of the Environmental Protection Agency reports on radon?
4. Do you know how to test your home for radon?
5. Has your household air been tested for the presence of radon gas?
6. Do you, or does anyone in your home, plan to have your household air tested for radon within the next year?
7. Please indicate your agreement or disagreement with the following statement: "Prolonged exposure to radon gas can be harmful to your health." Do you agree or disagree?
8. Which, if any of the following conditions do you think can be caused by prolonged radon exposure (Headache, asthma, arthritis, lung cancer, other cancer)?

For the respondents who said their household air had been tested for the presence of radon gas, the following questions were also asked:

9. Did you do the testing yourself or did you hire a testing service?
10. What method of testing was used (charcoal canister, alpha track, other)?
11. What was the radon level?
12. What action did you take as a result of the testing?