

Results of a Test and Win Contest to Raise Radon Awareness in Urban and Rural Settings

Ellen J. Hahn, Mary Kay Rayens, Sarah E. Kerckmar, and Heather Robertson
University of Kentucky

Sarah M. Adkins
Eastern Kentucky University

Background: Radon is a leading cause of lung cancer, but few test their homes to determine radon levels. **Purpose:** The study assessed feasibility and success of a Test and Win Contest to promote radon testing in rural and urban communities. **Methods:** The prospective, quasi-experimental study tested a novel contest to raise radon awareness. Paid and earned media recruited homeowners who received a free test kit and were eligible to win free home mitigation. Urban homeowners with the 5 highest radon levels and rural participants with the 3 highest won free radon mitigation systems. Cross-sectional surveys were completed via Internet or phone at enrollment. **Results:** Most returned the radon test kits (71% urban; 86% rural). Participation was more prevalent in the rural location most likely due to longer media recruitment (6 weeks vs. 11 days) and more money spent on media advertising (\$1.86 vs. \$0.21 per eligible household). The contest attracted 102 per 10 000 households to test for radon in the rural area compared to 19 per 10 000 households in urban counties. **Discussion:** The contest was a feasible and successful population-based strategy in both locations. **Translation to Health Education Practice:** The Test and Win Contest is a promising health education strategy to promote radon testing.

BACKGROUND

Radon is a leading cause of lung cancer, second only to smoking.¹⁻³ It is estimated that 15% of lung cancer cases in men and 53% in women are not caused by firsthand smoking.⁴ Radon exposure is linked to 15 400 to 21 800 cases of lung cancer in the United States each year,³ or approximately 10% of lung cancer cases.⁵ The combination of first- and secondhand smoke and radon exposure increases the risk of lung cancer nearly 10-fold.⁶

Radon is a naturally occurring, colorless, odorless, and tasteless radioactive gas derived from the decay of thorium and uranium, which are common elements found in rock and soil.³ Radon gas becomes entrapped in houses and other buildings by seeping into cracks in foundations or

basements or by entering through sump pumps or other drainage systems.⁶ Though most people have heard of radon, very few test their homes for the radioactive gas. One study reported that 82% of respondents had heard of radon but only 15% had tested for radon.⁷

The US Environmental Protection Agency (EPA) and the US Surgeon General both recommend that all homes be tested for radon gas.^{1,6} Radon can be detected with a simple home test kit and easily controlled through well-established venting techniques. Radon levels greater than 4 picocuries per liter (pCi/L) are at the action level requiring mitigation as designated by the EPA.⁶ If radon levels ≥ 4.0 pCi/L are detected, properly installed mitigation systems reduce the risk of exposure. When individuals are provided with evidence of elevated radon levels, they are more likely to mitigate.⁸⁻¹⁰ However, proper mitigation systems are expensive to install. Depending on the region of the United States, mitigation costs can range from \$1250 to \$1750 for an average home with a basement and up to \$2500–\$3000

Submitted March 1, 2013; accepted June 14, 2013.

Correspondence should be addressed to Ellen J. Hahn, Clean Indoor Air Partnership, College of Nursing, University of Kentucky, 760 Rose Street, Lexington, KY 40536-0232. E-mail: ejhahn00@email.uky.edu

for a home on a crawlspace. In addition to the fact that most people do not test their homes for radon, affordability and access to radon mitigation may be a barrier to taking action to fix the problem.

Population-based strategies designed to promote health reach large numbers of people by focusing on changing the environment¹¹ and have been shown to be effective in raising awareness and changing health behaviors.^{12,13} Quit and Win Contests promote smoking cessation¹⁴ and our team has reported these contests to be both efficacious and successful in attracting large numbers of smokers to make quit attempts¹⁵ regardless of socioeconomic status.¹⁶ In our controlled trial of a Quit and Win Contest, 494 tobacco users joined the contest in an attempt to quit; 25% of those in the contest were nonsmokers at 12 months post-baseline compared to 7% of controls.¹⁵ We adapted the Quit and Win Contest idea to the prevention of radon exposure by designing and evaluating a Test (your home for radon) and Win (a free radon mitigation) Contest to promote home radon testing.

PURPOSE

The primary aims of the study were to (1) assess the feasibility and success of conducting a population-based Test and Win Contest to promote home radon testing and (2) compare sociodemographic factors (e.g., demographics, smoking, experience with lung cancer) associated with enrollment in a Test and Win Contest in 2 communities, one rural and one urban. A secondary aim was to explore differences in intensity and duration of media outreach to promote the contest in urban versus rural communities. As a measure of success, we hypothesized that at least 50% of contest registrants would test for radon and return their test kits.

METHODS

Design and Sample

The Test and Win Contest research study was designed to encourage homeowners to test and mitigate their homes for radon. Contest participants lived in one of 2 geographic areas in Kentucky, one urban and one rural. Paid (e.g., radio and print ads, fliers/posters) and earned (e.g., television news stories) media during existing radon awareness events were used to recruit homeowners into the study. In order to enroll in the contest, participants had to be 18 years of age or older and a homeowner who had not tested his or her home for radon in the past. Homeowners registered online or via telephone. Participants received a free test kit with a cover letter and radon fact sheet, and they were eligible to win a free mitigation system installed by a National

Environmental Health Association–certified radon mitigation professional. Participants were asked to place the short-term radon test kit in their homes for 72 hours and then return it in a postage paid mailer directly to the company by a specified date. Results were mailed directly to the homeowner and the research team. The homeowners with the 5 highest radon levels in the urban location and the 3 highest levels in the rural county won free radon mitigation systems. For those with positive test results and who were not selected to win the free mitigation, a list of companies with National Environmental Health Association–certified radon mitigation professionals was provided. The contest participants completed a cross-sectional survey via the Internet using Qualtrics software (<http://qualtrics.com/>) or telephone at the time of enrollment.

More than half of the urban participants lived in Boone County (population 118811,¹⁷ 55%), 27% were from Kenton County (population 159721), and the remaining 17% resided in Campbell County (population 90336), all located in northern Kentucky. All of the rural participants lived in Boyle County (population 28451), located in central Kentucky. Based on the US Census, it was estimated that there were 100143 eligible urban households (homeowners) in northern Kentucky and 7521 in the rural county.¹⁷ As shown in Table 1, the majority of participants in the 2 geographic areas were female (57%), white (96%), and married (77%). Most did not have minor child(ren) living in the home (53%). The majority had at least some

TABLE 1
Demographic Comparisons Between Test and Win Participants in Urban Northern Kentucky and Rural Boyle County (N = 270).^a

	Northern Kentucky (N = 193) n (%)	Boyle County (N = 77) n (%)	χ^2 (p-value)
Gender			
Male	89 (46.1)	27 (35.5)	2.5 (.1)
Female	104 (53.9)	49 (64.5%)	
Race/ethnicity			
White	185 (95.8)	74 (96.1)	<0.1 (.9)
Minority	8 (4.2)	3 (3.9)	
Marital status			
Married	150 (77.7)	57 (74.0)	0.4 (.5)
Not married	43 (22.3)	20 (26.0)	
Minor children in the home			
Yes	96 (50.3)	30 (39.0)	2.8 (.1)
No	95 (49.7)	47 (61.0)	
Education			
At most high school	18 (9.4)	13 (17.6)	3.5 (.1)
At least some postsecondary	174 (90.6)	61 (82.4)	
Employed			
Yes	144 (75.4)	53 (70.7)	0.6 (.4)
No	47 (24.6)	22 (29.3)	

^a Values do not sum to the total in some cases due to missing responses.

postsecondary education (88%) and nearly three-quarters were employed (74%).

Recruitment via the Media

Media recruitment varied greatly between the urban and rural areas due in large part to cost, media outlet availability, and the time period available for recruitment. A total of \$21000 was available to spend on contest promotion via print newspaper ads and fliers over 11 days in the 3-county urban area, representing an estimated \$0.21 cents per eligible household. By contrast, we were able to spend \$1.86 per household in the rural area, for a total of \$14000 for radio and newspaper ads and fliers/posters over a period of 37 days. Buying media in the urban area was cost-prohibitive, and earned media was crucial to recruitment there. Contest recruitment in northern Kentucky was planned during Radon Action Week (October 19, 2009) to maximize existing media attention to the problem. A spontaneous, unplanned television news story (earned media) on radon prompted nearly half of the participants to enroll in the final days of the contest in northern Kentucky. Fliers were placed in public venues such as libraries, banks, community organizations, government buildings and websites, and businesses. Print ads were placed in the local weekly newspapers in each of the 3 counties; one ad in week 1 and one in week 2.

Buying media in rural Boyle County was more affordable, and there was a mixture of paid and earned media used to recruit participants. A 6-week media recruitment campaign was implemented based on market share and peak times information. Radio ads were purchased on 3 local radio stations 6 times per day for 3 days during week 1 and 6 times per day for 5 days per week during weeks 2 to 6. Print newspaper ads appeared 3 times per week during week 1, 2 times per week during weeks 2 and 6, and once per week during weeks 3 to 5. In addition, online ads on the newspaper's homepage appeared during weeks 2 to 6. The local cinema ran the print ad on the big screen at all showings during the 6-week campaign. In addition to the paid media, there was earned media from the local liberal arts college newspaper and the sponsoring university via their websites. Prompted by a press release, the local newspaper ran one story during week 1 and an opinion editorial during week 4. The local college newspaper also ran a story during week 1 and the faculty/staff newsletter included a story about the contest during weeks 4 and 6. During weeks 2 to 6, the sponsoring university ran the contest information on www.ukclinicalresearch.com and www.centerwatch.com. Additionally, recruitment posters and fliers were placed in Boyle County community venues (e.g., grocery stores, banks), physician offices, and major employers (e.g., manufacturing, college) during weeks 2 to 6.

Measures

The demographic characteristics of age, gender, race/ethnicity, marital status, presence of one or more minor children in the home, education, and employment status were included in the online enrollment survey in both locations.

Smoking and Secondhand Smoke Indicators

Smoking status of the respondent was assessed with the item "Do you currently smoke cigarettes, even just once in a while?" with a yes/no response choice. A second yes/no question was "Is there currently a smoker living in the home?" Indoor smoking in the home was assessed with the question "In the past 30 days, has anyone smoked inside your home?" with a yes/no option.

Lung Cancer Indicators

Two items, both with a yes/no response option, assessed experience with lung cancer. These were "Have you ever been told you have lung cancer?" and "Has anyone in your family ever been told they have lung cancer?"

Media Channels

A series of 5 checkboxes was used to assess the media channels that delivered information about the contest to participants. Survey participants were asked to indicate each of the ways they learned about the contest, checking as many as were applicable. Listed channels included "flier," "radio," "newspaper," "friend or family member," and "other." At least 10 participants listed Internet, television, and e-mail in the "other" category, so we created separate categories for these choices. The remaining uncategorized responses were retained in "other."

Data Analysis

The survey data were summarized by geographic location using descriptive methods, including frequency distributions or means and standard deviations. The contest participation rate was calculated based on the county-level percentage of households estimated to own their own homes.¹⁷ Comparisons between the 2 subsamples were accomplished using the chi-square test of association (for categorical measures) or 2-sample *t* test (for the continuous measure of age).

RESULTS

Feasibility and Success of the Contest

In urban northern Kentucky, 300 people expressed interest in the contest and 193 eligible northern Kentucky

residents were recruited over a short time span, from October 19 to October 30, 2009 (during Radon Action Week), with the majority of participants signing up during the final 3 days following an earned media television spot. Earned media was the most feasible option in northern Kentucky because the paid advertising was cost-prohibitive. In rural Boyle County, 77 eligible residents were recruited over a longer 6-week period from January 5, 2010, to February 11, 2010 (during Radon Action Month). More than half of the contest participants returned the radon test kits for analysis in both locations (71% in the urban counties and 86% in the rural area). Of those who returned readable radon test kits, 57% in the urban area and 47% in the rural county had radon levels greater than or equal to the recommended EPA action level of 4.0 pCi/L (ranges = 0.5 to 49.3 pCi/L and <0.3 to 37.7 pCi/L, respectively).

In the urban area with less paid media and a shorter recruitment period of only 11 days, the contest participation rate was 19 per 10 000 households. By contrast, the participation rate was 102 per 10 000 households in the rural community with more paid media and a longer 6-week recruitment period. The contest was feasible in both cases yet relied on different media channels and variable recruitment time. Participation was dependent on the ability to spread the word about the contest over time.

Sociodemographics, Smoking Indicators, and Lung Cancer

The participants in urban northern Kentucky were younger ($M = 50.4$, $SD = 13.6$) than those from rural Boyle County ($M = 54.5$, $SD = 12.0$; $t = 2.1$, $p = .04$). As shown in Table 1, the samples from the urban and rural locations were not significantly different on the other demographic factors (gender, race/ethnicity, marital status, presence of minor children in the home, education, and employment status). There were no urban/rural differences in smoking rate, presence of one or more smokers in the home, having had smoking occur in the home in the last 30 days, or a personal or family diagnosis of lung cancer (see Table 2). The majority of the combined sample were nonsmokers (92%) and did not have any smokers living in their home (84%). The majority reported that no smoking had occurred in their homes in the past 30 days (89%). In the full sample of urban and rural residents, 2% had been told they had lung cancer and 12% had a family member who had been told they had lung cancer.

Media Exposure

The urban and rural locations did not differ on exposure to the contest through friend or family member, or other channel ($p > .1$ for both comparisons) (see Figure 1). However, there were significant location differences for

TABLE 2
Smoking, Secondhand Smoke in the Home, and Lung Cancer Experience Comparisons Between Northern Kentucky and Boyle County ($N = 270$).^a

	Northern Kentucky ($N = 193$) n (%)	Boyle County ($N = 77$) n (%)	χ^2 (p-value)
Smoking status			
Smoker	12 (6.4)	8 (10.4)	1.3 (.3)
Nonsmoker	177 (93.6)	69 (89.6)	
Smoker(s) living in the home			
Yes	32 (16.7)	10 (13.0)	0.6 (.5)
No	160 (83.3)	67 (87.0)	
Smoking in the home			
Yes	21 (11.0)	9 (11.7)	<0.1 (.9)
No	169 (89.0)	68 (88.3)	
Ever been told you have lung cancer			
Yes	2 (1.0)	2 (2.7)	0.9 (.3)
No	188 (99.0)	73 (97.3)	
Family member ever been told they have lung cancer			
Yes	19 (10.2)	13 (16.9)	2.3 (.1)
No	168 (89.8)	64 (83.1)	

^a Values do not sum to the total in some cases due to missing responses.

fliers ($\chi^2 = 13.7$; $p = .0002$), radio ($\chi^2 = 31.7$; $p < .0001$), newspaper ($\chi^2 = 5.2$; $p = .02$), Internet ($\chi^2 = 9.1$; $p = .003$), television ($\chi^2 = 6.8$; $p = .009$), and e-mail ($\chi^2 = 4.3$; $p = .04$). Those in urban northern Kentucky were more likely to have been exposed to newspaper, Internet, and television (48%, 13%, and 8%, respectively) compared to those in rural Boyle County (32%, 1%, and 0%, respectively). On the other hand, those in rural Boyle County were more likely to have been exposed to fliers, radio, and e-mail (23%, 19%, and 9%, respectively) compared to urban northern Kentucky participants (7%, 1%, and 3%, respectively). For both the urban and rural area, newspaper was the most effective channel for reaching potential participants: nearly half of respondents in both regions indicated they had read about the Test and Win Contest in the newspaper (43%).

DISCUSSION

The Test and Win Contest to raise radon awareness and promote testing was a feasible, successful, and promising population-based strategy in both urban and rural locations. Most contest participants returned the radon test kits (71% urban; 86% rural). Participation in the contest was more prevalent in the rural location most likely due to a longer recruitment period (6 weeks vs. 11 days) and more money spent on media advertising (\$1.86 vs. \$0.21 per eligible household). The Test and Win Contest attracted 102 per 10 000 households to test for radon in the rural area compared to 19 per 10 000 households in urban counties.

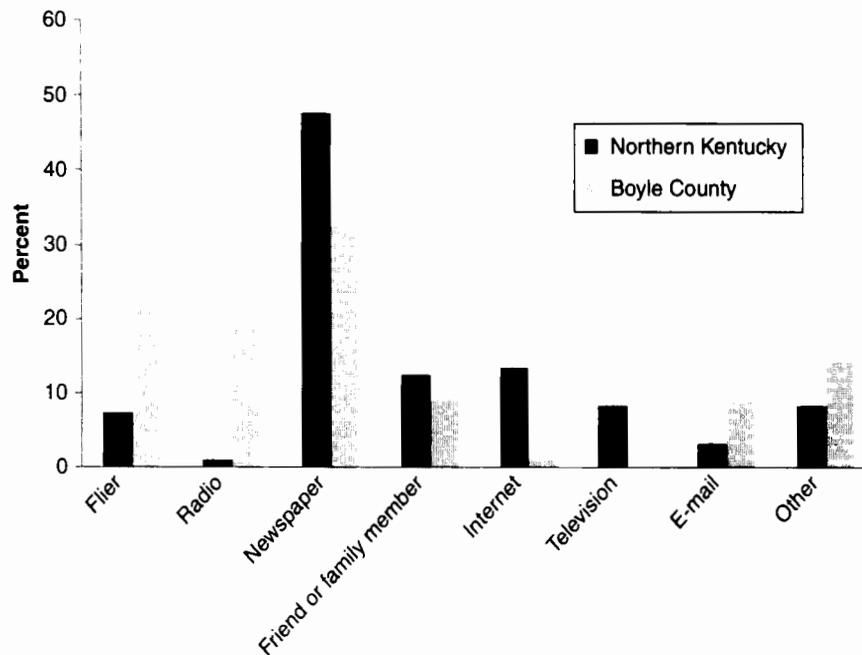


FIGURE 1 Percentage of participants exposed to each media channel, by location ($N = 270$). Note: Participants could select more than one media channel to indicate their exposure to the contest.

Most contest participants were female, nonsmokers, married, and of relatively high socioeconomic status (all were homeowners), and 12% had experience with lung cancer in their families. Newspaper was the most cited media channel for learning about the contest.

The contest participation rate per household was greater in the rural compared to the urban area. This was likely due to the fact that the media recruitment period was longer and more money was spent in media promotions in the rural area. Not only were we under time constraints to spend available dollars in the urban area, but the cost of advertising was also prohibitive. One unplanned earned media news spot on television yielded nearly half of the contest participants in the urban area. The success of population-based contests to promote radon awareness was dependent on the ability to advertise over time. In urban areas where the advertising costs may be excessive, earned media using television outlets might be explored. Deciding to hold the contest during or after Radon Action Week in October and/or Radon Action Month in January is a way to build on radon prevention activities and existing resources.^{18,19} Radon education and community awareness may have enhanced motivation to participate in the contest.

Contest participants from the 2 locations were similar in terms of most demographics, smoking exposure indicators, and lung cancer experience. Contest participants from the urban area were younger than those from rural area. Individuals who are older are less likely to perceive radon as a serious risk and less likely to demonstrate protective radon behaviors than younger age groups.¹⁰ The fact that a higher

percentage of participants living in urban areas were younger than in the rural county may have had more to do with the length of the recruitment phase and the media channels used. Research also shows that males,^{10,20} minorities,²⁰ those who are less educated,^{7,8} those who are smokers,²¹ and those with lower incomes^{8,20,22} are less likely to demonstrate protective radon behaviors. Those who perceive themselves as susceptible to lung cancer are more likely to test for radon.^{23,24} This could be one reason why the sample of both urban and rural contest participants were predominantly female, of relatively high socioeconomic status (all were homeowners), and had experience with lung cancer. Knowing what actions were taken as a result of the contest was beyond the scope of this study.

The primary limitation of this study was the lack of variability in socioeconomic status, as indicated by relatively high educational attainment, in both geographic areas. This could be due, in part, to the fact that homeownership was required to participate in the contest. The percentage with at least some postsecondary education was notably higher than would be expected based on census data; the percentage with postsecondary education is 23% in rural Boyle and ranges from 26% to 30% in the 3 urban counties of northern Kentucky.¹⁷ These findings may not be extended to the general population of urban and rural residents in Kentucky; however, it is unknown what the average education level is among homeowners in these counties. Given that the contest was designed to reach homeowners, the lack of variability in socioeconomic status was expected. More diverse recruitment methods may be needed to reach potential homeowners

of lower SES status. Another limitation is that demographic data on nonparticipants were not available, and it was beyond the scope of this study to identify demographic characteristics that predicted contest participation. Rather, this study describes those who chose to participate in the contests. Future studies are needed to determine predictors of Test and Win Contest participation. We also were not able to capture the effects of the media promotions on population-based testing outside of the contest participants. The media promotions in the rural county may have prompted additional radon testing that we did not capture in our study. Further research is needed on the population-based effects of Test and Win campaigns. Lastly, given that media outreach was costly in the urban area and vastly different across communities, caution is warranted in interpreting the rural–urban comparisons in both contest participation rate and exposure to particular media channels. These findings suggest that participation may be related to media exposure, which is likely related to both channels and duration, but further study is warranted. Future research is needed to test for differences in contest participation and exposure by controlling for duration and media channels.

TRANSLATION TO HEALTH EDUCATION PRACTICE

The Test and Win Contest generated interest and was feasible. We were able to recruit homeowners in both an urban and rural community but recruitment was enhanced by a longer media recruitment period and more resources for media promotions. The contest was successful in promoting radon testing in urban and rural areas. Among contest registrants, radon testing rates exceeded our expectations. We expected that 50% would test their homes. However, nearly three fourths in the urban area and nearly 9 of 10 registrants in the rural county tested their homes for radon as a result of entering the contest. The fact that, on average, over half of those who tested had radon levels exceeding the EPA action level reveals the importance of developing and testing population-based approaches to promote radon testing as a lung cancer prevention strategy for health educators.

Although exposure to the contest was significantly different for urban and rural areas for most media channels, newspaper was the most frequently cited source for learning about the contest regardless of location. We were able to place print media ads about the contest in both locations, although the duration and intensity of print media exposure was greater in the rural area due to the relative affordability of media buys. Given differences in media cost and availability by area, the type and duration of media promotion varied between the sites in this study. However, print newspaper advertising may be the most affordable, effective way²⁵ of reaching homeowners about

testing for radon regardless of location. Given that health promotion resources are always a challenge, prioritizing print media to promote radon testing is recommended given the affordability and availability in most communities. As expected, rural participants were more likely to hear of the contest via the radio (we were able to place radio ads over a 6-week period in the rural county) than urban participants. Resources are needed to support effective paid media over a period of time^{26,27} to promote population-based health education strategies such as Test and Win Contests.

For health educators to afford to conduct a Test and Win Contest involving adequate media exposure, a blend of paid and earned media is optimal. Television advertising is beyond reach of most health education programs. Using creative ways to leverage media coverage via earned media especially in urban areas is essential. For example, in our study, urban participants were more likely than rural participants to hear about the contest via television (a television story happened to mention the contest as part of a story on Radon Action Week).

Not only is earned media an effective strategy to promote lung cancer prevention,^{28,29} it also may be the only option when cost is an issue. Newspapers provide several opportunities for earned media such as submitting letters to the editor or opinion editorials. Health educators can ask to be a guest columnist to increase awareness about health issues such as radon exposure and testing. Further, developing relationships with health reporters and/or newspaper editors is an effective media advocacy strategy that can prompt editorials and interest in radon testing as a lung cancer prevention strategy. Other examples of earned, or unpaid, media are articles in faith community bulletins or electronic newsletters, blog posts, and radio/television talk shows and public service announcements. The Test and Win Contest is a promising population-based lung cancer prevention strategy to raise awareness about radon exposure and promote radon testing.

FUNDING

This project was supported by the Robert Wood Johnson “Tobacco Policy Change: A Collaborative for Healthier Communities and States” (Northern Kentucky Clean Indoor Air Collaborative #64496) and the Kentucky Radon Program (EPA State Indoor Radon Grants CFDA #66.032).

REFERENCES

1. US Department of Health and Human Services. Surgeon General releases national health advisory on radon. <http://www.surgeongeneral.gov/pressreleases/sg01132005.html>. Published 2005. Accessed January 23, 2007.
2. Reuben S. Reducing environmental cancer risk: what we can do now. *The President's Cancer Panel AR*. Bethesda, MD: US Department of Health

and Human Services, National Institutes of Health, National Cancer Institute; 2010:1-55.

3. Zeeb H, Shannoun F, eds. *WHO Handbook on Indoor Radon: A Public Health Perspective*. Geneva, Switzerland: World Health Organization; 2009.

4. Sun S, Schiller JH, Gazdar AF. Lung cancer in never smokers—a different disease. *Nat Rev Cancer*. 2007;7:778-790.

5. Committee on Health Risks of Exposure to Radon (BEIR VI) NRC. *Health Effects of Exposure to Radon: BEIR VI*. Washington, DC: National Research Council; 1999.

6. US Environmental Protection Agency. *A Citizen's Guide to Radon: A Guide to Protecting Yourself and Your Family From Radon*. Washington, DC: US Environmental Protection Agency; 2012.

7. Wang Y, Ju C, Stark AD, Teresi N. Radon awareness, testing, and remediation survey among New York State residents. *Health Phys*. 2000;78:641-647.

8. Wang Y, Ju C, Stark AD, Teresi N. Radon mitigation survey among New York State residents living in high radon homes. *Health Phys*. 1999;77:403-409.

9. Riesenfeld EP, Marcy TW, Reinier K, et al. Radon awareness and mitigation in Vermont: a public health survey. *Health Phys*. 2007;92:425-431.

10. Duckworth LT, Frank-Stromborg M, Oleckno WA, Duffy P, Burns K. Relationship of perception of radon as a health risk and willingness to engage in radon testing and mitigation. *Oncol Nurs Forum*. 2002;29:1099-1107.

11. Osei-Assibey G, Dick S, Macdiarmid J, et al. The influence of the food environment on overweight and obesity in young children: a systematic review. *BMJ Open*. 2012;2:e001538.

12. National Cancer Institute. *Population-Based Smoking Cessation: Proceedings of a Conference on What Works to Influence Cessation in the General Population*. Bethesda, MD: US Public Health and Human Service, National Institute of Health, National Cancer Institute; 2000. NIH Pub. No. 00-4892.

13. Poortinga W, Bronstoring K, Lannon S. Awareness and perceptions of the risks of exposure to indoor radon: a population-based approach to evaluate a radon awareness and testing campaign in England and Wales. *Risk Anal*. 2011;31:1800-1812.

14. Cahill K, Perera R. Quit and Win contests for smoking cessation. *Cochrane Database Syst Rev*. 2008;(4):CD004986.

15. Hahn EJ, Rayens MK, Warnick TA, et al. A controlled trial of a Quit and Win contest. *Am J Health Promot*. 2005;20(2):117-126.

16. Hahn EJ, Rayens MK, Chirila C, Riker CA, Paul TP, Warnick TA. Effectiveness of a quit and Win contest with a low income population. *Prev Med*. 2004;39:543-550.

17. US Census Bureau. State and county quick facts. <http://quickfacts.census.gov/qfd/index.html>. Published 2010. Accessed December 26, 2012.

18. Seifert CM, Chapman LS, Hart JK, Perez P. Enhancing intrinsic motivation in health promotion and wellness. *Am J Health Promot*. 2012;26:TAHP1-12.

19. O'Donnell MP. A simple framework to describe what works best: improving awareness, enhancing motivation, building skills, and providing opportunity. *Am J Health Promot*. 2005;20(1):84, iii, suppl 1-7.

20. Halpern MT, Warner KE. Radon risk perception and testing: sociodemographic correlates. *J Environ Health*. 1994;6(7):31-35.

21. Hampson SE, Andrews JA, Barckley M, Lichtenstein E, Lee ME. Personality traits, perceived risk, and risk-reduction behaviors: a further study of smoking and radon. *Health Psychol*. 2006;25:530-536.

22. Hill WG, Butterfield P, Larsson LS. Rural parents' perceptions of risks associated with their children's exposure to radon. *Public Health Nurs*. 2006;23:392-399.

23. Sandman PM, Weinstein ND. Predictors of home radon testing and implications for testing promotion programs. *Health Educ Q*. 1993;20:471-487.

24. Weinstein ND, Sandman PM, Roberts NE. Perceived susceptibility and self-protective behavior: a field experiment to encourage home radon testing. *Health Psychol*. 1991;10:25-33.

25. Smith KC, Wakefield M. Textual analysis of tobacco editorials: how are key media gatekeepers framing the issues? *Am J Health Promot*. 2005;19:361-368.

26. Noar SM. A 10-year retrospective of research in health mass media campaigns: where do we go from here? *J Health Commun*. 2006;11:21-42.

27. Randolph W, Viswanath K. Lessons learned from public health mass media campaigns: marketing health in a crowded media world. *Ann Rev Public Health*. 2004;25:419-437.

28. Niederdeppe J, Farrelly MC, Wenter D. Media advocacy, tobacco control policy change and teen smoking in Florida. *Tob Control*. 2007;16:47-52.

29. Stillman F, Cronin K, Evans W, Ulasevich A. Can media advocacy influence newspaper coverage of tobacco: measuring the effectiveness of the American stop smoking intervention study's (ASSIST) media advocacy strategies. *Tob Control*. 2001;10:137-144.