

## Quantifying littered cigarette butts to measure effectiveness of smoking bans to building perimeters.

By: Christopher M. Seitz, Robert W. Strack, Muhsin Michael Orsini, Carrie Rosario, Christie Haugh, Rebecca Rice, David L. Wyrick & Lorelei Wagner

**This is an Author's Accepted Manuscript of an article published in**

[Seitz, C. M.](#), [Strack, R. W.](#), [Orsini, M. M.](#), Rosario, C., Haugh, C., Rice, R., [Wyrick, D. L.](#), & Wagner, L. (2012). Quantifying littered cigarette butts to measure effectiveness of smoking bans to building perimeters. *Journal of American College Health*, 60(4), 331-334.

[copyright Taylor & Francis], available online

at: <http://www.tandfonline.com/10.1080/07448481.2011.609205>.

### **Abstract:**

**Objective:** The authors estimated the number of violations of a university policy that prohibited smoking within 25 ft of all campus buildings. **Participants:** The project was conducted by 13 student researchers from the university and a member of the local public health department. **Methods:** Students quantified cigarette butts that were littered in a 30-day period inside the prohibited smoking area of 7 campus buildings (large residential hall, small residential hall, administrative building, 2 academic buildings, campus cafeteria, and student union). **Results:** Investigators found a total of 7,861 cigarette butts (large residential hall: 1,198; small residential hall: 344; administrative building: 107; 2 academic buildings: 1,123 and 806; campus cafeteria: 2,651; and student union: 1,632). **Conclusions:** Findings suggest that there is low compliance with the university's smoking policy. The described project may be repeated by students at other universities as a method to advocate for policy change.

**Keywords:** administration | community health | health education | smoking ban | public health | cigarette smoking

### **Article:**

Secondhand smoke contains at least 250 toxic chemicals that increase one's risk of developing lung cancer, heart disease, and vascular health problems. 1 The Surgeon General, 1 the Community Guide to Preventive Services, 2 and the American College Health Association 3 all recommend smoking bans and restrictions to protect individuals from exposure to secondhand smoke. In order to decrease student, faculty, and staff exposure to secondhand smoke, numerous colleges have implemented policies that prohibit smoking around the entrances or perimeters of campus buildings. 4 Although research on the topic is limited, a few studies indicate that most smokers on college campuses do not comply with outdoor smoking policies. 5 – 7 To further understand the compliance, or lack thereof, of outdoor smoking policies on college campuses, this Experiences From the Field article describes a project conducted to estimate how often an

outdoor smoking policy was violated on a university campus. The project quantified cigarette filters, also known as cigarette “butts,” that were littered inside of prohibited outdoor smoking areas within a 30-day period.

Cigarette filters, a form of nonbiodegradable plastic, were created by tobacco companies in the 1950s in response to research studies that linked cigarette smoke to the development of lung cancer. 8 By 1993, 99% of all cigarettes bought in the United States were filtered. 8 In 2009, Keep America Beautiful conducted a national study to determine the littering behaviors of people, finding that smokers commonly litter cigarette butts (roughly 65% of the time) and that of those who litter, 66% litter by dropping the item straight down on the ground, as compared to flicking or brushing the item away. 9

Based on this knowledge, researchers in the described project assumed that 1 cigarette butt littered within the prohibited smoking area was an indication of 1 violation to the campus’ outdoor smoking policy. This assumption was made for 3 reasons. First, as mentioned previously, nearly all purchased cigarettes in the United States have filters, meaning that unfiltered cigarettes, which are biodegradable, would not act as a confounder to the project’s results. Second, cigarette butts are nonbiodegradable; therefore, it was assumed that all littered cigarette butts would be accounted for since none would have degraded within the project’s 30-day period. Third, because cigarette butts are littered 65% of the time and are most often dropped on the ground, it was assumed that the cigarette butts found within the prohibited smoking area came from people who were smoking cigarettes and then littered their cigarette butts within the prohibited area.

## METHODS

The project was conducted in the Fall semester of 2010 at a public university in the Southeast region of the United States. The university has a student population of 18,000 with over 4,000 living on campus in residence halls. The university prohibits smoking inside campus buildings and outdoors within 25 ft of any building. The prevalence of students who smoke at the university is unknown; however, according to the Centers for Disease Control and Prevention, 26% of college-aged adults are current smokers within the state where the university is located. 10

### Sample

To create a representative sample, the types of buildings on campus were stratified into 6 categories: large residential halls ( $n = 7$ ; 300–400 occupants), small residential halls ( $n = 15$ ; 90–215 occupants), administrative buildings ( $n = 8$ ), academic buildings ( $n = 22$ ), cafeteria ( $n = 1$ ), and student union ( $n = 1$ ). From within these categories, 1 building was randomly selected for the study; however, due to the large number of academic buildings on campus, 2 buildings were randomly selected from this category.

## Procedure

The project was conducted in 3 phases: (1) the initial cigarette butt clean-up event, (2) the 30-day follow-up clean-up event, and (3) counting the cigarette butts found from the 30-day follow-up event. Before starting the first phase, project leaders met with the supervisor of the university's grounds crew to inform him about the project and obtain his expert opinion about the barriers involved with the project, such as weather, grounds crew duties with litter, and the effects of leaf-blowers. The supervisor informed the project leaders that he would instruct the grounds crew not to pick up any cigarette butts during the project's timeline. The supervisor also stated, based on his observations of campus cigarette litter, that the weather or the way in which the grounds crew uses leaf-blowers would not affect the study's results.

The initial cigarette butt clean-up event was carried out on October 30, 2010, by 14 people, including the lead project researchers, students from the university, and a member of the local public health department. The team met on campus at 9 am for training. Members were divided into 2 teams of 7 people per team. Team members were provided with rubber gloves for sanitary purposes. Each team was given a 25-foot piece of rope to ensure that the teams were picking up cigarette butts within the prohibited area designated by the current university smoking policy. One team member held an end of the rope against the wall of a building, while another team member held the other end of the rope and stretched it out perpendicular in length from the building's wall. The rest of the team members picked up each littered cigarette butt found within the rope's length and placed the cigarette butts into trash bags. This process continued along the entire perimeter of each building in the sample. The clean-up event required 6 hours of time. The cigarette butts found from the initial clean-up event were discarded.

The 30-day follow-up cigarette butt clean-up event was conducted on December 7, 2010. Although the difference in time from the initial and follow-up clean-up events was more than 30 days, the 30-day follow-up clean-up event was delayed in order to account for the number of days the university was closed for the Thanksgiving holiday. The same procedures were conducted for the follow-up event as the initial clean-up event; however, in the follow-up, cigarette butts were placed into trash bags, sealed, and labeled with the name of each respective building in the sample.

The littered cigarette butts found from the 30-day follow-up were counted by hand on December 9, 2010. The team members were provided with several pairs of rubber gloves and surgical masks for sanitation purposes. Each trash bag from its respective building was unsealed and the cigarette butts were counted into piles of 10 and recounted by a second team member for reliability. Once a trash bag's contents were emptied, the piles of cigarette butts were totaled by building and tallied into a spreadsheet.

## Measures

Littered cigarette butts were included in the project's results even if the cigarette's paper was no longer attached to the filter. However, cigarette paper by itself that was not attached to a filter was not counted as a cigarette butt. Because “smoking” includes tobacco items other than just cigarettes, littered wooden and plastic cigar tips found within the prohibited smoking areas were also included into the project's results. The number of cigar tips was not recorded separately from the number of cigarette butts.

## RESULTS

As illustrated in Table 1, the project's team members counted the indicated number of cigarette butts littered within the buildings' prohibited smoking areas. Overall, the number of cigarette butts collected from the sample of buildings totaled 7,861 during the study's 30-day period. Twice as many cigarette butts were collected within the prohibited smoking perimeter of the cafeteria as compared with the residential halls and academic buildings. The least number of cigarette butts were collected within the prohibited smoking perimeter of the administrative building.

TABLE 1 Cigarette Butts Found Within Building Perimeters in a 30-Day Period

Type of building	Building specifications	No. entrances/ exits	Building size (sq ft)	No. cigarette butts
Large residential hall	300–400 occupants	3	48,903	1,198
Small residential hall	90–215 occupants	3	21,487	1,344
Academic building no. 1	21 classrooms, 608 seats	5	73,126	1,123
Academic building no. 2	24 classrooms, 727 seats	3	53,375	1,806
Cafeteria	N/A	4	59,061	2,651
Student union	N/A	100	116,609	1,632
Administrative	N/A	3	33,638	1,107

## COMMENT

Based upon the number of littered cigarette butts found, the project's team members estimated that within a 30-day period, there were at least 7,861 violations to the university's outdoor smoking policy within the perimeter of 7 campus buildings. Ultimately, the number of violations was an indication that there was low compliance with the campus' outdoor smoking policy. The research team is using the findings presented here to advocate for increased enforcement and

more effective smoking restrictions in order to protect the campus population from secondhand smoke. The project's results confirm the conclusions made by previous studies that students, faculty, and staff might not comply with smoking policies that prohibit smoking 25 to 30 ft away from campus buildings. 5 – 7

The project described in this article is an idea that may be repeated at other universities by students who are interested in encouraging a change to smoking policy. If their findings suggest low compliance, students should use the cigarette butts as a visual to advocate to university administrators for a change in policy. The methodology described in this article may be modified according to smoking policy that is not perimeter based. For instance, if a campus policy prohibits smoking only at building entrances, students may pick up cigarette butts around the designated length from entrances instead of entire building perimeters. This recommendation is based from anecdotal evidence of other university policies, as the exact number of universities that have perimeter versus entrance outdoor smoking policies is unknown.

### Limitations

The project had several limitations. First, it was possible that the project's team members did not pick up every cigarette butt that was littered inside of the prohibited smoking areas. For instance, leaves, brush, mulch, and other material could have covered cigarette butts from the view of the team members. Second, data from the project represents cigarette butts picked up from a sample of buildings on a college campus and does not represent total smoking policy violations for the entire campus. Third, because not all smokers litter their cigarette butts, the number of littered cigarette butts should be considered a conservative estimate of the actual number of smoking violations. Fourth, because the project was conducted at only 1 university, its results are not generalizable to other universities or colleges.

### Conclusions

If the goal of implementing smoking policies on a college campus is to limit the exposure of individuals to secondhand smoke, the current project supports previous research that questions the effectiveness of smoking bans that restrict smoking within a defined outside perimeter of buildings. 5 – 7 Future studies might explore enforcement strategies to increase compliance, or alternatively investigate if there is a difference in compliance, with campus policies that prohibit smoking at various distances from campus buildings (eg, 25, 50, or 100 ft) or campus policies that ban smoking outright.

### ACKNOWLEDGMENTS

The authors would like to thank the following student researchers for their data collection efforts: Emily Moore, Dominique Hoyt, Anna Cowan, Rebecca Elkin, Brandon Grove, Ed Matthews, Kenny Hartman, Tyron Alston, and Rom Hoontrakul.

## REFERENCES

1. US Department of Health and Human Services. 2006. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*, Atlanta, GA: Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, Coordinating Center for Health Promotion, Centers for Disease Control and Prevention, US Department of Health and Human Services.
2. Recommendations regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. 2001. Task Force on Community Preventive Services. *Am J Prev Med*, 20(2S): 10–15.
3. American College Health Association. 2007. Position statement on tobacco on college and university campuses. *J Am Coll Health*, 55: 255–256.
4. Halperin, A C and Rigotti, N A. 2003. US public universities' compliance with recommended tobacco-control policies. *J Am Coll Health*, 51: 181–188.
5. Amerando, C, Becker, C M and Johnson, H. 2010. An evaluation of a university-based smoking policy: a student research project. *Am J Health Stud*, 25: 111–116.
6. Cho, Y and DeVaney, S A. 2010. Understanding college students' opinions on a smoking policy. *Int J Consum Stud*, 34: 388–393.
7. Harris, K J, Stearns, J N, Kovach, R G and Harrar, S W. 2009. Enforcing an outdoor smoking ban on a college campus: effects of a multicomponent approach. *J Am Coll Health*, 58: 121–126.
8. Novotny, T E, Lum, K, Smith, E, Wang, V and Barnes, R. 2009. Cigarettes butts and the case for an environmental policy on hazardous cigarette waste. *Int J Environ Res Public Health*, 6: 1691–1705.
9. Keep America Beautiful. 2010. Littering behavior in America: results of a national study. Available at: [http://www.kab.org/site/DocServer/KAB\\_Report\\_Final\\_2.pdf?docID=4581](http://www.kab.org/site/DocServer/KAB_Report_Final_2.pdf?docID=4581). Accessed on December 23
10. Centers for Disease Control and Prevention. 2010. *Tobacco Control State Highlights, 2010*, Atlanta, GA: Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, US Department of Health and Human Services.