

Evaluation of Arizona State University's Tobacco-Free Campus Policy

Assessment of Policy Impacts and Return on Investment

June 2014

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Funding provided by:

Maricopa County Department of Public Health



Acknowledgements

In addition to the Maricopa County Department of Public Health, SIRC researchers would like to thank the following individuals, listed alphabetically, for their contributions to this report:

- Jillian McManus, Director, Organizational Health & Development, ASU
- Karen Moses, Director, Wellness & Health Promotion, ASU
- Elizabeth Phillips, University Provost & Executive Vice President, ASU
- Kevin Salcido, Associate Vice President and Chief Human Resource Officer, ASU

Without the information these individuals provided and their assistance with survey development, distribution and data collection, this project would not have been possible. Thank you.

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Executive Summary

The Maricopa County Department of Public Health (MCDPH) and the Southwest Interdisciplinary Research Center (SIRC) at Arizona State University (ASU) initiated an evaluation of ASU's Tobacco-Free Campus policy, which went into effect on August 1, 2013. The purpose of this evaluation was to assess the impacts of this policy on the ASU community and environment. This report summarizes tobacco consumption patterns, norms and perceptions surrounding tobacco use, tobacco litter on campus, and overall benefits of a tobacco-free campus both before and after policy implementation.

Methodology

In order to provide a comprehensive assessment of tobacco use at Arizona State University (ASU) and its associated health and financial costs in advance of the implementation of the tobacco-free campus policy, data were collected on a multitude of process, outcome, and cost measures. Data collection methods included:

- **ASU Faculty and Staff Survey**
In 2013, this survey was distributed to all 8,960 benefits-eligible faculty and staff at ASU. More than 3,200 respondents completed the survey for a response rate of 36 percent. In 2014, the post-policy implementation survey was distributed to 8,413 benefits-eligible employees, resulting in a response rate of 37.4 percent (n = 3,147).
- **ASU Student Survey**
In the Spring of 2013, the National College Health Assessment (NCHA-II), including supplemental questions in support of the tobacco-free campus evaluation, was distributed to a random sample of 20,000 ASU graduate and undergraduate students; it was completed by 1,547 students (a response rate of 7.7%). In 2014, an online post-policy implementation survey was distributed independent of the NCHA-II to another random sample of 20,000 students, resulting in a response rate of 18.6 percent (n = 3,728).
- **ASU Student Qualitative Questionnaire**
In order to further evaluate attitudes, opinions, and expectations related to the tobacco-free campus policy, an online questionnaire was administered to all students who reported current tobacco use on the 2014 survey and a willingness to participate in a follow-up assessment (N= 718). This questionnaire resulted in a response rate of 30.8 percent (n = 221).
- **Focus Groups**
Two focus groups were conducted for this evaluation, one with eight members of the ASU groundskeeping crew on the Tempe campus and a second with six staff members from the Tempe campus who currently use tobacco products and were willing to participate in follow-up assessment activities following the online survey. The groundskeepers provided information on perceived policy impacts with respect to tobacco-related litter and the cleanliness of campuses. The staff focus group (response rate 27.3%, n = 6) further investigated attitudes, opinions, and expectations related to the tobacco-free campus policy.

- **Tobacco-related Litter in the ASU Environment**

SIRC researchers and students conducted a manual tally of tobacco-related litter (e.g., cigarette butts, cigarette and cigar wrappers, lighters, matchbooks, etc.) across several ASU campuses at three different time points: Spring 2013, Fall 2013, and Spring 2014.

Additional data and information were collected via informal and unstructured one-on-one and group interviews, emails and phone conversations with key staff and student informants at ASU.

Assessment Highlights

ASU Faculty/Staff Survey

- The percentage of respondents who were aware of the tobacco-free campus policy grew to 97.5 percent. The level of support for the policy increased from 80.5 percent in 2013 to 85.3 percent in 2014.
- Roughly seven percent of ASU faculty and staff reported currently smoking cigarettes in 2013 and 2014; approximately five percent currently used other tobacco products in 2013 with this percentage decreasing to approximately 4 percent in 2014.
- A smaller percentage of current (past 30 days) or recent (past 12 months, but not in last 30 days) smokers reported *excellent* or *very good* health than those who have not smoked within the last 12 months, particularly among the 2014 sample.
- There was a 48.8 percent reduction in the amount of secondhand smoke respondents reported being exposed to on campuses between 2013 and 2014.
- Respondents reported a 27.4 percent reduction in frequent reports of tobacco-related litter between 2013 and 2014.
- The majority of staff and faculty reported that the tobacco-free campus policy either *greatly* or *somewhat* reduced the amount of tobacco-related litter (61.9%) and secondhand smoke (61.6%) they are exposed to on campus.
- The majority of respondents believed that ASU campuses should remain 100 percent tobacco-free. The most frequently endorsed policy enforcement method was to give warnings to violators of the policy, followed by issuing a small fine.

ASU Student Survey

- In the Spring of 2014, 88.5 percent of respondents were aware of ASU's tobacco-free campus policy. The majority of these respondents also believed that the policy was adequately communicated (59.5%).
- More than eight in ten students (81.2%) reported supporting the tobacco-free campus policy in 2014. This is about a 3 percent increase in support from 2013.
- Approximately 14.7 percent of ASU students were current cigarette smokers in 2013 and 13.3 percent were current smokers in 2014, indicating a 9.5 percent reduction in use. However, current use of smokeless tobacco, hookah, and e-cigarettes increased.

- By 2014, the proportion of students reporting frequent exposure to secondhand smoke was nearly cut in half. Furthermore, there was a 20.8 percent decrease in the amount of tobacco-related litter observed following- policy implementation.
- By 2014, slightly more than 18 percent of student tobacco users felt that the policy had an influence on their quitting.
- More than half of student respondents attributed reductions in secondhand smoke (54.6%) and tobacco-related litter (53.6%) on campus to the policy.
- The majority of respondents believed that ASU campuses should remain 100% tobacco-free. However much like staff and faculty, a large proportion of respondents felt that there should be designated smoking areas on campus to accommodate tobacco users.
- As with the faculty/staff survey, the most frequently selected policy enforcement technique was to give warnings to violators of the policy, followed by issuing a small fine and reporting the violator to student conduct or a supervisor.

Student Qualitative Questionnaire

- Many students, mostly non-users, reported that the overall campus environment had improved as a result of the policy. They believed that campuses were cleaner and that the policy resulted in fewer smokers and secondhand smoke. However, both users and non-users acknowledged that the policy likely just shifted where people smoke, such as behind buildings and in stairwells.
- Tobacco users, however, felt that the largest impact of the policy was that it led to a less friendly campus characterized by more interpersonal conflict. Smokers reported feeling “harassed.”
- Respondents reported concerns about policy enforcement and suggested implementing designated smoking areas as a solution to noncompliance.

Staff Focus Groups

- Participants liked that the tobacco-free campus policy was a good influence on health and smoking habits. They believed that it encouraged smokers to take fewer breaks and to smoke less on campus as the policy makes smoking less convenient and less socially accepted among college students.
- Participants also reported appreciating that campuses were generally cleaner and fresher smelling.
- Participants believed that the policy had a limited effect on encouraging smokers to quit and that it had no impact in their off-campus behavior.
- Respondents reported concerns about policy enforcement and that the soft, or peer, enforcement invites interpersonal conflict among staff and students. A recommended solution was to designate authorized individuals to deter smoking through visual cues.
- Staff also believed that the policy may have shifted where people smoke and that it is happening in more hidden areas where tobacco-related litter has been accumulating. A suggested policy solution is to designate specific smoking areas on campuses.

Tobacco-related Litter in the ASU Environment

- Cigarette butts made up the vast majority of tobacco-related litter and were most commonly found in the garden strips between sidewalks and public streets, on the edges of sidewalks (especially those along public streets), in flower beds, and in the grates surrounding trees.
- Policy implementation may have had an influence on smoking behavior, and therefore the amount of smoking-related litter. Litter counts on each campus generally declined across each data collection point, anywhere from 32 percent to 82 percent.
- Some of the largest percent decreases were noted on the Downtown campus, in particular around Taylor Place and on the Taylor Mall.

Summary of the Return on Investment (ROI) Analysis

The strategy employed to estimate the return on investment associated with the tobacco-free campus policy focused on health benefits and reduced healthcare costs generated by the policy. The ROI assessment found the following:

- Benefits of the Tobacco-Free Campus Policy exceed the costs.
- Using the proportion of smokers that had quit for 30 days, the 2013 staff and faculty survey respondents had a quit rate of 35.9 percent while the 2014 respondents had a quit rate of 34.6 percent.
- A significant shift in smoking rates was not observed among students following the implementation of the tobacco-free campus policy.
- When comparing student survey respondents who started smoking after coming to ASU, but who have not smoked in the last 30 days, there is a statistically significant drop from 11.4 percent to 5.6 percent from 2013 to 2014. Applying this percentage to the overall student population suggests that as many as 4,200 fewer students may have tried smoking for the first time while at ASU in the year following the implementation of the tobacco-free campus policy.
- Assuming that 25 percent of the 4,200 student smokers who were deterred from trying cigarettes for the first time eventually became heavy smokers, then they would each have ultimately incurred the \$229,837 in social costs associated with a lifetime of smoking. This would result in an aggregate present value cost of \$241,328,850.
- Given that the entire costs of implementing the program totaled roughly \$80,000, the lifetime return on investment of this policy for just one person would be 280 percent.
- These evaluation results do not indicate any significant cost savings to ASU due to changes in faculty and staff tobacco use that can be attributed to the tobacco ban.

Conclusions

- In general, survey results demonstrated that the majority of students, staff, and faculty supported a tobacco-free campus, and a smaller proportion of smokers indicated that the policy had some influence in reducing their tobacco use. Furthermore, significant reductions in perceived levels of tobacco-related litter and secondhand smoke were reported following implementation of the policy.
- Survey data revealed that at this point the most visible change in actual smoking behavior that coincides with ASU's adoption of the policy was a significant reduction in students trying cigarettes for the first time following their enrollment in ASU.
- The lifetime cost savings in deterring new, regular smokers would justify adoption of the policy.
- Concerns remain related to compliance and soft enforcement methods for the policy. Many respondents feel stronger methods, such as the involvement of authorized ASU personnel in issuing warnings or fines, would be more effective.

Evaluation of Arizona State University's Tobacco-Free Campus Policy

Assessment of Policy Impacts and Return on Investment Estimates

Background

Tobacco use remains the leading cause of preventable death in the United States (Koh, 2012).¹ To address this nationwide public health issue, many states and organizations have begun to implement various tobacco control programs. Given today's widespread recognition that tobacco use is a public health hazard along with convincing research findings that showed the associations between tobacco control policies and decreased tobacco use and tobacco-related health consequences, many colleges and universities have recently begun to implement their own tobacco control policies. The American College Health Association Guidelines, last updated in November 2011, now advocate for a campus-wide tobacco-free environment. The first tobacco-free college campus policy was established as recently as the early 2000s. There are now more than 750 college campuses nationwide that have gone 100 percent tobacco-free, and nearly 400 more that have gone smoke-free (American Nonsmokers' Rights Foundation, November 2013), which clearly illustrates the popularity of tobacco-free policy uptake among U.S. colleges and universities.

Alignment with Healthy People 2020 Goals

Tobacco-free campus policies are directly in line with the Healthy People 2020 goals as well. The following Healthy People 2020 goals and objectives specifically relate to tobacco use among adults over 18 and college-aged individuals:

1. Reduce tobacco use by adults
 - a. Reduce cigarette smoking by adults to 12.0 percent.
 - b. Reduce use of smokeless tobacco products by adults to 0.3 percent.
 - c. Reduce use of cigars by adults to 0.2 percent.
2. Reduce the initiation of tobacco use among young adults aged 18 to 25 years by 2 percentage points
 - a. Reduce the initiation of the use of tobacco products by young adults to 8.8 percent.
 - b. Reduce the initiation of the use of cigarettes by young adults to 6.3 percent.
 - c. Reduce the initiation of the use of smokeless tobacco products by young adults to 0.2 percent.
 - d. Reduce the initiation of the use of cigars by young adults to 4.1 percent.
3. Reduce the proportion of nonsmokers exposed to secondhand smoke by 10 percent.

¹ Refer to the 2013 Evaluation of Arizona State University's Tobacco-Free Campus Policy report for a full review of tobacco-related research and statewide initiatives.

ASU's Tobacco-Free Policy

The Arizona State University (ASU) tobacco-free campaign began in 2009 by a student organization called Health and Counseling Student Action Committee (HCSAC). From 2009 to the adoption of a tobacco-free campus policy on November 15, 2012, HCSAC advocated for this policy through petitions, articles in local newspapers, student action letters sent directly to ASU President, Michael Crow, and through various tobacco awareness events held on ASU campuses. In the process, HCSAC gained key supporters including Undergraduate Student Government (USG) in late 2010, which released position statements supporting increased smoking regulations, and the faculty Academic Senate in late 2012, which ultimately approved the proposed tobacco-free policy.

The ASU tobacco-free campus policy (ACD 804: Tobacco-Free Campus) went into effect on August 1, 2013 and states:

To protect the health and safety of university faculty, staff, students, and visitors on the campuses of ASU... Smoking and the use of smokeless tobacco products are prohibited in or on all university:

1. *Owned property*
2. *Leased property*
3. *Facilities*
4. *Grounds*
5. *Parking structures*
6. *University-owned vehicles*

Since tobacco-free campus policies such as this one are relatively new, evidence of their impact remains sparse. Thus, in order to assess the effectiveness of ASU's new tobacco-free campus policy as well as its return on investment, comprehensive evaluation was necessary. This evaluation report compared data on both pre- and post-policy implementation measures.

Methodology

In order to provide a comprehensive assessment of tobacco use at ASU and its associated health and financial costs in advance of and following the implementation of the tobacco-free campus policy, data were collected through multiple methods.

ASU Faculty and Staff Survey

In the Spring of 2013, an online survey was distributed via ASU's Chief Human Resources Officer to all benefits-eligible faculty and staff (n=8,960) in order to assess tobacco-use on and off-campus, quitting behavior, motivations to quit smoking, and general health prior to implementation of ASU's tobacco-free campus policy. The survey allowed for respondents to skip questions, and the skip pattern of the survey allowed only those who responded to certain questions to answer subsequent questions. More than 3,200 (n=3,239) faculty and staff completed the online survey for an overall response rate of 36 percent.

In April 2014, a post-policy implementation online survey was distributed to all 8,413 benefits-eligible staff and faculty, with a response rate of 37.4 percent (n = 3,147). This survey measured

tobacco-use, quitting behavior, motivations to quit, and general health again, in addition to opinions about the implementation of ASU's tobacco-free campus policy, barriers to its success, and potential influences on quitting and/or smoking deterrence.

Items for both the pre and post-implementation surveys were selected from a variety of national- and state-level surveys such as the National Survey of Drug Use and Health (NSDUH) and the Arizona Health Survey (AHS), as well as from post-surveys conducted at other universities and items requested by the Maricopa County Department of Public Health.

ASU Student Survey

Assessment of student tobacco-use and related behaviors was conducted in parallel to the staff and faculty assessment process. Online surveys were developed and distributed to a random sample of students in the Spring of 2013 (pre-policy implementation) and in the Spring of 2014 (post-policy implementation). Administration for both surveys was conducted in coordination with the ASU Office of Student Wellness, which distributes the National College Health Assessment (NCHA-II) in coordination with the American College Health Association (ACHA) annually to a random sample of 20,000 ASU students at the undergraduate and graduate levels.

Additional tobacco policy questions were included in ASU's 2013 NCHA-II survey by SIRC researchers for the purposes of evaluating the tobacco-free campus policy. However, for the 2014 administration, SIRC researchers designed a separate survey from the NCHA-II and distributed it to a random sample of 20,000 students with the assistance of the ASU Office of Student Wellness.

In order to encourage participation in the 2013 survey, ASU officials offered participants an entry into a prize drawing for the opportunity to win one of ten \$200 ASU Maroon & Gold gift cards. To encourage participation in the 2014 survey, researchers offered participants an entry into a prize drawing for the opportunity to win one of twenty \$50 Visa® gift cards.

The 2013 survey resulted in a response rate of 7.7 percent (n = 1,547); 18.6 percent (n = 3,728) completed the survey in 2014.

Unless otherwise indicated, pre-implementation tobacco usage rates are reported based on student responses to the supplemental questions that were added to the 2013 NCHA-II specifically for the purposes of this study. The standard NCHA-II also includes tobacco use questions; however, the standard questions are worded slightly differently and reported usage rates were slightly (1-2%) lower for cigarettes and cigars, cigarillos or pipes, and slightly (1.2%) higher for smokeless tobacco as compared to the reported usage rates for these products on the supplemental questions. However, for both the 2013 and 2014 assessments, student daily consumption was determined by tobacco product usage over the past 30 days from survey administration.

ASU Student Qualitative Questionnaire

The 2014 student survey was followed by an online qualitative questionnaire to investigate further the attitudes, opinions, and expectations for ASU's tobacco-free campus policy. Specifically, questioning focused on beliefs about policy impact, barriers to implementation, and recommendations to improve compliance. The questionnaire was administered to all students who reported current tobacco use on the 2013 student survey and willingness to participate in follow-up assessment (N = 718). The response rate for the questionnaire was 30.8 percent (n = 221).

Tobacco-related Litter in the ASU Environment

A manual tally of tobacco-related litter (e.g., cigarette butts, cigarette and cigar wrappers, lighters, matchbooks, etc.) was conducted on ASU campuses in the Spring and Fall of 2013 and the Spring of 2014 to assess policy compliance and changes in litter as a potential result of policy implementation (Fallin et al., 2012).

SIRC researchers mapped out high usage areas of campus as well as boundaries where litter was expected. All researchers and students who conducted the manual tallies were given a common tally sheet on which to record their litter observations and were instructed to include in their tallies only the tobacco-related litter that fell explicitly within the boundaries of ASU's designated tobacco-free zones. This includes most walkways, buildings, garages and garden areas on campus, but does not include most paved streets which fall under the purview of the local governmental agencies in each city in which an ASU campus is located.

Data collectors summed the total observations of tobacco-related litter for each section of campus for which they were responsible and recorded this information, as well as the date and time the tally was conducted.

The following areas on each campus were observed for tobacco-related litter:

- Downtown
 - University Center and University Center Garage (perimeter and 3rd floor only)
 - Taylor Place (on-campus housing)
 - Taylor Mall (between University Center and the Cronkite Building)
 - Mercado (perimeters and interior walkways between all buildings)
- Tempe
 - Cady Mall
 - Forest Mall
- West
 - Verde Mall
 - Verde Dining Pavilion
 - Las Casas Residence Hall
 - Wood Drive
- Polytechnic (litter count was not conducted in the Spring of 2013)²
 - Sonoran Arroyo Mall
 - Backus Mall
 - Sun Devil Mall

Focus Groups

Groundskeeper Focus Group

A focus group was conducted with eight members of the groundskeeping crew on the ASU Tempe campus in order to better understand implications of the tobacco-free campus policy. Specifically,

² Following an interview with an ASU Facilities representative, researchers decided not to collect litter tally data in the spring of 2013 at the ASU Polytechnic campus. According to this representative, the ASU Polytechnic campus was already nearly smoke-free as it has designated smoking areas in place that are the only places individuals may smoke on campus.

questions asked about perceptions of policy impact, concerns about tobacco-related litter on campus, recommendations for policy compliance, and methods of enforcement. All of the participants were male non-smokers with an average age of 46.5 years (50% non-Hispanic White, 37.5% Hispanic/Latino, 12.5% American Indian/Alaska Native).

Staff Focus Group

The 2014 staff and faculty survey was followed by a focus group to investigate further the attitudes, opinions, and expectations for ASU's tobacco-free campus policy. Similar to the student qualitative questionnaire, questioning focused on beliefs about policy impact, barriers to implementation, and recommendations to improve compliance. Participation in the focus group was offered to all staff and faculty who reported current tobacco use on the 2014 survey and willingness to participate in a follow-up assessment (N = 22). Based upon participant availability, the focus group was limited to faculty and staff at the Tempe campus. The overall response rate for the focus group was 27.3 percent (n = 6).

Assessment Findings

ASU Faculty/Staff Survey

These surveys provided baseline and post-implementation information on the attitudes and behaviors of the ASU faculty and staff regarding tobacco use and perceptions of the tobacco-free policy. Of the 2013 survey respondents, 26 percent self-identified as faculty with 74 percent as staff members; this compares to the actual ASU employee percentages of 29 percent faculty and 71 percent staff (although a significant portion of staff appear to serve in faculty positions as well). Of the 2014 survey respondents, 23 percent self-identified as faculty and 76 percent as staff. Overall ASU employee percentages in 2014 were 35 percent faculty and 65 percent staff. Faculty members appear to be slightly less represented in the 2014 sample than in the 2013 survey sample.

Policy Awareness and Support

When the 2013 survey was administered, almost all (94%) respondents indicated that they were aware that ASU would be a tobacco-free campus as of August 1, 2013. Approximately two-thirds of them (64.9%) said that there had been adequate communication about the new policy, one-third said there had not been enough communication, and less than 2% said there had been too much communication.

By the Spring of 2014, the percentage of respondents who were aware of the tobacco-free campus policy grew to 97.5 percent. Slightly more respondents (66.6%) felt communication about the policy was adequate, 28.5 percent felt there was not enough communication, and 4.3 percent believed there was too much.

The majority (80.5%) of faculty and staff said that they supported the tobacco-free policy in the Spring of 2013. Of those, 62 percent *strongly agreed* while 15 percent *disagreed* and five percent were *neutral*. By 2014, the level of support increased to 85.3 percent, with 71.1 percent in strong agreement of the policy. Similar to the 2013 survey results, far fewer males were in support of the policy (78.8%) than females (90.1%). However, attitudes did not differ by employee role, whether faculty or staff.

Tobacco Use and Perceptions

In both years, more than eight in ten faculty and staff agreed that smoking cigarettes was perceived negatively by close friends and colleagues.

Respondents who reported using a tobacco product at least once in their lifetime on each survey were then asked to respond to questions regarding tobacco use behaviors. Those who responded *no* to this question skipped the tobacco use behavior questions. Across both years, those who reported smoking cigarettes in the past 30 days were identified as current users (n = 257; Table 1).

Table 1. Last Time Used Tobacco.

		2013		2014	
		Count	%	Count	%
Cigarettes	In the past 30 days	257	11.8%	219	11%
	In the past 12 months but not in the past 30 days	144	6.6%	116	5.8%
	Sometime in your lifetime but not in the past 12 months	1615	74.4%	1492	74.9%
	Never	155	7.1%	152	7.6%
	Total	2171	100.0%	1993	100.0%
	Other (including e-cigarettes)	In the past 30 days	157	7.4%	129
In the past 12 months but not in the past 30 days		154	7.2%	170	8.6%
Sometime in your lifetime but not in the past 12 months		921	43.2%	1020	51.8%
Never		900	42.2%	638	20.3%
Total		2132	100.0%	1177	100.0%

Note: The numbers listed in this table only include those who reported ever having used tobacco in their lifetime, not the entire sample for each survey. Thus, of the total 2013 survey sample (n = 3,239), 7-8% are current cigarette smokers and approximately 5% are current users of other tobacco products or e-cigarettes. Of the 2014 sample (n = 3,147), 7% are current smokers and 4.1% are current users of other tobacco products.

A total of 157 respondents from the 2013 survey indicated they had used e-cigarettes or some other tobacco product in the past 30 days; 69 of these were the same people who said that they had smoked cigarettes in the past 30 days. Thus, the total of 345 current tobacco product users (257+157-69) represented approximately 10 percent of the sample of 3,239 faculty and staff.

Among the 2014 respondents, 58 reported both cigarette and other tobacco product usage (including e-cigarettes) in the last 30 days. Therefore, the 290 current users in 2014 represent 9.2 percent of the total staff and faculty sample.

Health and Productivity

When asked about their general health, more than 90 percent of 2013 survey respondents said they had *good* to *excellent* health: one-fourth (24.9%) said their health was *excellent*, nearly half (46.2%) said their health was *very good*, with 24.4 percent claiming to have *good* health. There was a significant difference (p < .05) between faculty and staff responses on this question, with 37.5 percent of faculty compared to 20.6 percent of staff indicating that their health was *excellent*.

According to 2014 survey respondents, 96.1 percent reported having *good* to *excellent* health, with nearly 70 percent (69.7%) claiming *very good* to *excellent* health. Many staff reported *very good* or *excellent* health (67.2%) while 78.7 percent of faculty reported *excellent* or *very good* health. These differences were statistically significant ($p < .001$). In 2013, 30 percent responded no work days missed in the past year due to personal illness. In 2014, the majority (68.4%) of respondents missed fewer than five days of work due to illness, with 26.2 percent having missed zero days of work.

Table 2. General Health of Cigarette Smokers.

	Smoked Cigarettes						ALL	
	In the past 30 days		In the past 12 months but not in the past 30 days		Sometime in your lifetime but not in the past 12 months		All respondents, smokers and nonsmokers	
	2013	2014	2013	2014	2013	2014	2013	2014
Excellent	18.4%	16.6%	27.3%	18.0%	24.9%	24.3%	24.9%	23.9%
Very Good	40.8%	44.5%	44.6%	38.7%	47.2%	46.2%	46.2%	45.8%
Good	35.1%	35.1%	24.5%	36.9%	23.4%	25.6%	24.4%	26.4%
Fair	5.3%	3.3%	2.9%	5.4%	3.9%	3.6%	4.0%	3.6%
Poor	0.4%	0.5%	0.7%	0%	0.6%	0.1%	0.5%	0.1%
Total	100%	100%	100%	100%	100%	100%	100%	100%

$p < .05$

There was a statistically significant difference by health category for the last time someone had smoked a cigarette in both 2013 and 2014 (Table 2). Generally, **a smaller percentage of current (past 30 days) or recent (past 12 months, but not in last 30 days) smokers reported excellent or very good health than those who have not smoked within the last 12 months**, particularly among the 2014 sample.

In both 2013 and 2014, only one percent of respondents indicated they had visited a doctor or hospital in the past year for a tobacco-related health issue. Of those who had been told by a doctor or health professional that they had a health issue that might be related to tobacco, nearly three-fourths said they did not have any of the issues listed. However, roughly 15 percent of respondents in 2013 and 2014 had been told that they had asthma and 2.1 percent had been told that they had chronic bronchitis or other noncancerous lung disease (Table 3).

Table 3. Health Issues.

	2013	2014
Asthma	15.0%	15.3%
Cancer of the lungs; mouth, nose or throat; larynx; trachea; esophagus; stomach; pancreas; kidneys and ureters; bladder; cervix; or bone marrow and blood	0.9%	1.2%
Chronic bronchitis, emphysema, COPD, or other lung disease (not including cancer)	2.1%	2.1%
Heart disease	2.0%	2.0%
Obesity	12.1%	12.1%
Stroke	0.6%	0.7%
None of the above	73.1%	70.0%

Campus Environment

In both survey years, the majority of respondents were on the Tempe (74% in 2013 and 76.1% in 2014) or Downtown (11% in 2013 and 10.6% in 2014) campuses. In response to exposure to secondhand smoke, 21.3 percent said this occurred *all of the time* or *often* in 2013, while only 10.9 percent said this in 2014. **This is a 48.8 percent reduction in the amount of secondhand smoke respondents reported being exposed to on ASU campuses** ($z = 10.87, p < .001$).

A chi-square test of significance was performed for both 2013 and 2014 and confirmed a statistically significant difference by campus ($p < .05$). **Respondents at the Tempe campus were more likely to encounter secondhand smoke than were their colleagues at other campuses.**

Table 4. On an Average Day, Frequency of Exposure to Secondhand Smoke while on Campus.

	Downtown campus	Polytechnic campus	Tempe campus	West campus	Other	Total
2013						
All of the Time	2.3%	2.0%	5.2%	4.8%	2.2%	4.6%
Often	11.1%	10.8%	18.7%	14.0%	4.3%	16.7%
Sometimes	33.1%	23.0%	32.3%	30.1%	22.6%	31.5%
Rarely	41.4%	52.7%	35.4%	38.7%	50.5%	37.6%
Never	12.0%	11.5%	8.4%	12.4%	20.4%	9.6%
2014						
All of the Time	0.0%	0.0%	2.3%	0.0%	2.4%	1.9%
Often	2.3%	5.0%	10.7%	4.2%	3.6%	9.0%
Sometimes	17.0%	20.7%	29.4%	14.6%	14.3%	26.4%
Rarely	52.8%	52.1%	42.7%	39.6%	42.9%	43.9%
Never	27.9%	22.1%	14.7%	41.7%	33.3%	18.4%

* $p < .05$

As to the amount of tobacco-related litter on campus, 43 percent said they noticed it *some* or *a lot* of the time in 2013 compared to 32.4 percent in 2014 (Table 5). **This is a 27.4 percent reduction in frequent reports of litter.**

The chi-square test of significance (without the Other category) showed a significant difference by campus ($p < .05$) for both survey administration years. Respondents at the Tempe campus and at the Polytechnic campus were more likely to encounter tobacco-related trash on campus in 2013. However, by 2014, litter on campuses declined. The Tempe campus in particular showed significant declines in the amount of perceived litter, from 46.3 percent to 7.4 percent ($z = 27.71, p < .001$).

Table 5. On an Average Day, Amount of Tobacco-Related Litter You Notice on Campus

	Downtown campus	Polytechnic campus	Tempe campus	West campus	Other	Total
2013						
A Lot	7.1%	12.8%	12.5%	3.2%	2.2%	11.0%
Some	24.9%	27.7%	33.8%	25.3%	31.5%	31.9%
Little	48.0%	44.6%	40.1%	41.9%	43.5%	41.4%
None	20.0%	14.9%	13.6%	29.6%	22.8%	15.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2014						
A Lot	1.0%	5.0%	0.2%	4.2%	3.6%	6.3%
Some	14.1%	25.0%	7.2%	16.0%	20.2%	26.1%
Little	50.2%	47.9%	28.8%	34.0%	33.3%	43.2%
None	34.8%	22.1%	43.2%	45.8%	38.1%	23.9%
Total	100.0%	100.0%	20.7%	100.0%	100.0%	100.0%

* $p < .05$

Policy Compliance and Perceived Impacts

Since implementation of the tobacco-free campus policy, only 3.5 percent of faculty and staff reported using tobacco products while on campus. **The majority of faculty and staff reported that the tobacco-free campus policy either *greatly* or *somewhat* reduced the amount of tobacco-related litter (61.9%) and secondhand smoke (61.6%) to which they were exposed** (Table 6). Further, approximately one-fourth of the sample believed the policy had an impact on their colleagues' use of tobacco products (23% either *greatly* or *somewhat* reduced).

Interestingly, over five percent felt the policy increased the amount of tobacco-related litter seen on campus and nearly four percent believed it increased the amount of secondhand smoke exposure. This is consistent with some of the qualitative data collected through focus groups and the online student questionnaire which indicates that many smokers have simply moved to different areas on campus to smoke, particularly in more hidden, out of the way areas. As such, faculty, staff and students that work near or travel through these new smoking areas may perceive an increase in secondhand smoke and litter even though the pervasiveness of these substances/items appear to be decreasing overall.

Table 6. Reported/Perceived Changes due to Tobacco-Free Campus Policy.

	Reduced Greatly	Reduced Somewhat	No change	Increased Somewhat	Increased Greatly	N/A
Your cigarette smoking	1.0%	1.2%	8.3%	0.1%	0.1%	88.7%
Your use of smokeless tobacco	0.2%	0.3%	5.6%	0.1%	0.1%	92.7%
Your use of e-cigarettes	0.4%	0.2%	6.1%	0.3%	0.4%	91.3%
Your colleagues' use of tobacco products	5.9%	17.1%	23.7%	0.8%	0.5%	47.9%
Secondhand smoke you are exposed to	23.9%	37.7%	19.2%	2.1%	1.8%	14.0%
Tobacco-related litter you see on campus	19.3%	42.6%	18.6%	3.0%	2.5%	12.3%

Furthermore, respondents for the 2014 survey were asked about their perspective regarding policy compliance and enforcement (Figure 1). The majority of respondents believed that ASU campuses should remain 100 percent tobacco-free (78.8% *agree to strongly agree*). At the same time, a sizeable fraction of respondents felt that there should be designated smoking areas on campus to accommodate tobacco users (30.9% *agree to strongly agree*).

Over half of respondents *agreed or strongly agreed* (54.4%) that tobacco-free signage was readily noticeable; however, there were doubts as to whether the signage is truly effective in deterring tobacco use on campus (only 23.8% *agreed or strongly agreed* that signage was effective).

Given that the policy currently relies on peer or community enforcement, it is also notable that four of ten faculty and staff reported that they would not ask someone to stop if they noticed them using tobacco on campus.

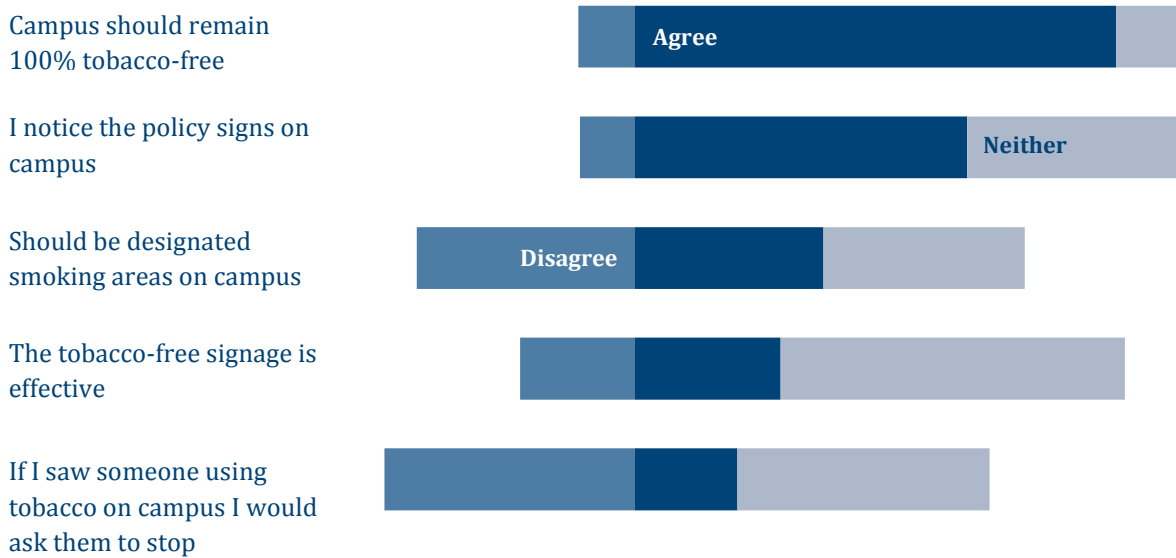


Figure 1. Agreement with policy compliance measures.

Note. "Agree" = agree + strongly agree; "disagree" = disagree + strongly disagree; "neither" = somewhat agree + neither agree nor disagree + somewhat disagree.

Enforcement

With regard to enforcement, respondents provided a number of recommendations. Overall, most respondents felt that **some procedure to improve enforcement is needed**. Specifically, the most frequently selected technique was to give warnings to violators of the policy, followed by issuing a small fine (27.3% endorsed this option).

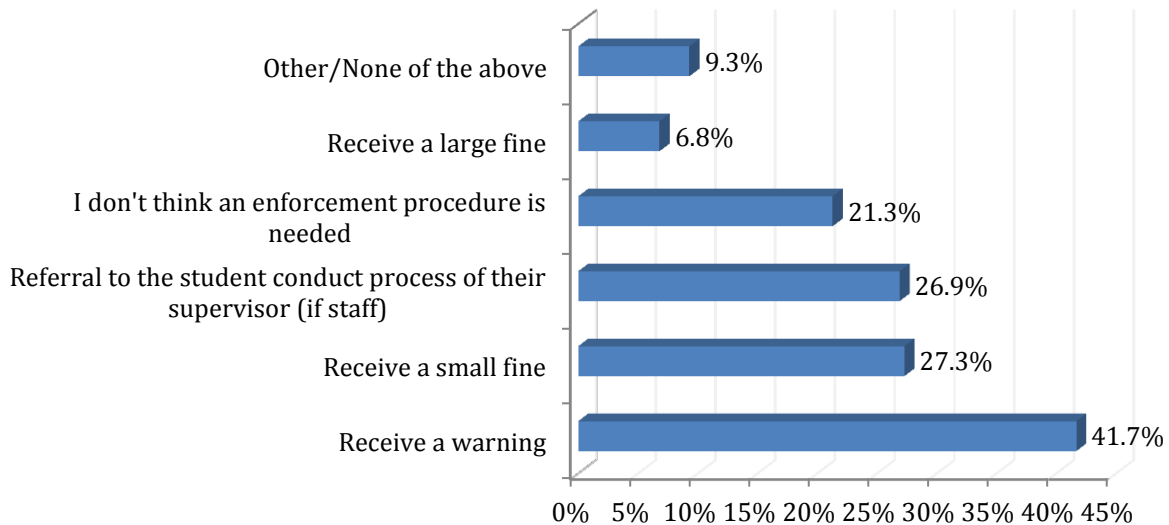


Figure 2. Staff Recommendations for Policy Enforcement (respondents could endorse more than one option).

ASU Student Survey

Data from the 2013 and 2014 student evaluation surveys were analyzed to estimate changes in current tobacco usage and trends among ASU students prior to and after tobacco-free policy implementation. The majority of survey respondents on each survey were female, white, non-Hispanic, and in school full-time. A comparison of survey respondent demographics to overall ASU student population demographics for 2013 is displayed in Table 7. Since it is difficult to make claims of representativeness based on the survey sample, all results referring to “ASU students” can be most accurately interpreted as referring to the students surveyed rather than to the entire ASU student population.

Table 7. Demographics of Survey Respondents vs. Overall ASU Student Population

		2013 Survey Sample	2014 Survey Sample	2013-2014 ASU Student Population
Race/Ethnicity*	American Indian or Alaska Native	3.0%	1.7%	1.5%
	Asian	10.1%	11.1%	5.6%
	Black or African American, non-Hispanic	3.3%	3.0%	4.8%
	Hispanic/Latino	15.2%	13.4%	18.1%
	International	6.7%	--	8.7%
	Multi-racial	4.0%	--	2.9%
	White, non-Hispanic	73.4%	63.1%	56.9%
Gender	Male	35.9%	45.7%	50.3%
	Female	63.8%	53.4%	49.7%
Age**	Under 25	57.4%	62.8%	68.5%
	25 and Over	42.6%	37.2%	31.5%
Student Level	Graduate	23%	24.3%	19.1%
	Undergraduate	77%	74%	80.9%
Enrollment Status	Full-time	88.9%	88.8%	80.7%
	Part-time	10.5%	9.9%	19.3%
Campus (primary)*	Downtown	13.1%	11.5%	26.4%
	Polytechnic	2.8%	5.0%	14.7 %
	Tempe	65.0%	72.9%	81.5%
	West	4.2%	4.5%	18.3%
	Online Only/Other	13.3%	5.5%	n/a

* Race/ethnicity and primary campus figures cannot be directly compared as the 2013 survey sample percentages are unduplicated totals and the ASU student population percentages are not.

** Age for the ASU student population was reported using Fall 2012 enrollment data.

Policy Awareness and Support

Overall, 81 percent of students were aware at the time of the pre-survey that ASU would be a tobacco-free campus as of August 1, 2013. Correspondingly, a higher percentage of non-users (45% vs. 30%) felt that there had not been enough communication about the policy. Students most likely to know about the policy were first-year undergraduates, students living on-campus, and students attending ASU full time. Likewise, with the possible exclusion of full-time students, these same groups were also those most likely to feel the policy had been adequately communicated.

In the Spring of 2014, 88.5 percent of respondents were aware of ASU's tobacco-free campus policy. The majority of these respondents also believed that the policy was adequately communicated (59.5%), while nearly one-third felt there was not enough communication about the policy (32.2%).

The majority of respondents (78.9%) reported supporting the existence of the tobacco-free policy in 2013, while more than eight in ten students (81.2%) reported supporting it in 2014. This is a nearly 3% increase in support.

Tobacco Use and Perceptions

Findings from the 2013 NCHA-II supplemental tobacco use indicated that three in five students had never smoked cigarettes (60.6%), while slightly fewer 2014 survey respondents had never used cigarettes (58.6%). While the remainder of students may have tried or HAD been regular users of tobacco products at some point in their lifetimes, only 23.3 percent currently used tobacco of any sort. Approximately 14.7 percent of ASU students were current cigarette smokers in 2013; 13.3 percent are current smokers of cigarettes in 2014, indicating a 9.5 percent reduction in current use ($z = 2.14, p = .02$). Furthermore, current cigar, cigarillo, or pipe use decreased to 5.9% in 2014. However, current use of smokeless tobacco, hookah, and e-cigarettes increased (Figure 3).

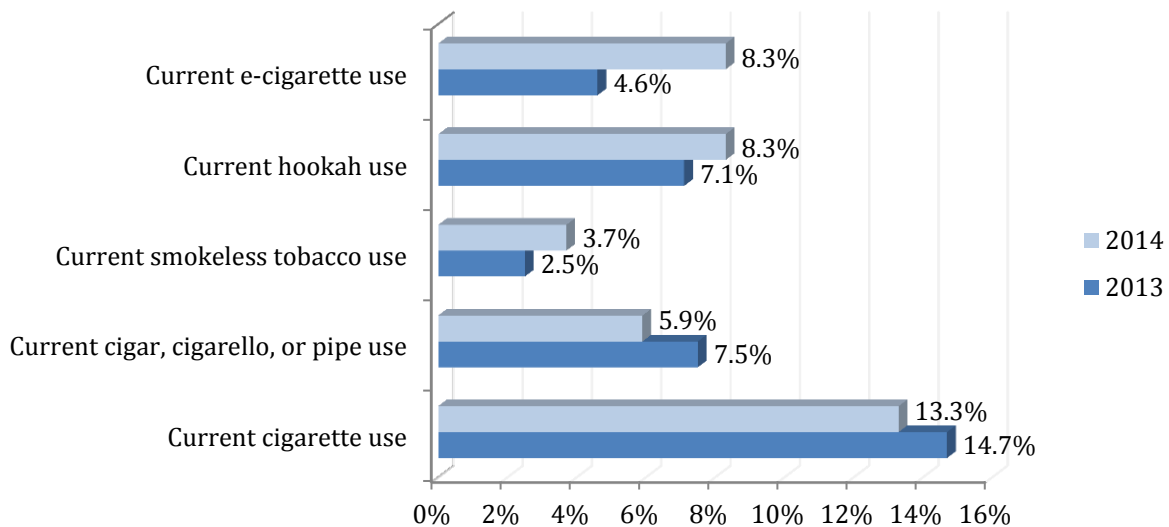


Figure 3. 2013 and 2014 Current Student Tobacco Product Usage.

Health and Productivity

In 2013, those who used cigarettes within the past 30 days (i.e., current smokers) were also less likely to report that their health was excellent or very good than those who had smoked in the past 12 months, but not in the past 30 days, or those who had smoked in the past, but not in the last 12 months (Table 8). Similarly, 2014 current smokers were also less likely to report having *excellent* or *very good* (65.8%) health compared with those who are not current smokers.

Table 8. General Health of Cigarette Smokers.

	Smoked Cigarettes			ALL
	In the past 30 days	In the past 12 months but not in the past 30 days	Sometime in your lifetime but not in the past 12 months	All respondents, smokers and nonsmokers
2013				
Excellent	9.7%	13.5%	16.4%	15.4%
Very Good	30.4%	49.4%	37.3%	41.6%
Good	38.9%	49.4%	37.3%	33.5%
Fair	10.6%	5.6%	8.4%	8.0%
Poor	1.3%	3.4%	1.4%	1.4%
Total	100.0%	100.0%	100.0%	100.0%
2014				
Excellent	18.0%	23.6%	29.9%	27.0%
Very Good	47.8%	50.1%	48.8%	48.5%
Good	28.8%	23.1%	18.2%	20.9%
Fair	4.4%	2.9%	2.4%	2.8%
Poor	0.8%	0.2%	0.5%	0.4%
Total	100.0%	100.0%	100.0%	100.0%

Campus Environment

Most students were *satisfied* or *very satisfied* with the overall cleanliness of the campus (67.4%) in 2013. A commensurate proportion of respondents felt campuses were clean in 2014 (66.1%).

Table 9. On an Average Day, Amount of Tobacco-Related Litter You Notice on Campus

		Downtown	Polytechnic	Tempe	West	Total
2013	A Lot	5.5%	7.0%	15.8%	1.6%	11.9%
	Some	32.5%	25.6%	28.9%	31.3%	27.6%
	Little	36.5%	44.2%	38.3%	29.7%	37.0%
	None	25.5%	23.3%	17.0%	37.5%	23.5%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
2014	A Lot	4.9%	9.0%	6.4%	0.6%	5.7%
	Some	24.6%	22.3%	27.6%	14.3%	25.6%
	Little	41.5%	44.1%	46.1%	41.1%	44.5%
	None	28.5%	24.5%	19.8%	43.5%	23.3%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%

When asked how frequently students were exposed to secondhand smoke on an average day while on campus, one-third (33%) said *often* or *all the time* in 2013; an additional 30 percent said *sometimes*. Only one of every ten students (10%) said that they were *never* exposed to secondhand smoke on campus. **By 2014, the proportion of students reporting frequent exposure to secondhand smoke was nearly cut in half** (15.9%; $z = 13.65, p < .001$).

As to the amount of tobacco-related litter on campus, 39.5 percent of students said they noticed it *some* or *a lot* of the time, while more than half said they noticed *little* or *no* trash. Following implementation of the tobacco-free campus policy, 31.3 percent of respondents reported seeing tobacco-related litter on campus *a lot* or *some* of the time, which is 20.8 percent decrease ($z = 5.66, p < .001$).

Policy Compliance and Perceived Impacts

At the time of the 2013 survey, 12 percent of current tobacco users reported that the impending tobacco-free campus policy had already had an influence on their quitting or attempting to quit smoking cigarettes or using other tobacco products, and approximately three-quarters of current cigarette smokers reported that they planned to quit within the next year (25.7% within the next month; 28.6% within 6 months; and 20% within a year).

By 2014, slightly more than 18 percent of student tobacco users felt that the policy had an influence on their quitting. Specifically, 4.3 percent felt the policy either *greatly* or *somewhat* reduced their cigarette use, while more than one-fifth believed the policy reduced their peers' use of tobacco products (20.7%).

Approximately 11.7 percent of students reported having used tobacco on campus since the policy was implemented; two percent ($n=78$) reported doing so daily.

Table 10. Reported/Perceived Changes due to Tobacco-Free Campus Policy.

	Reduced Greatly	Reduced Somewhat	No change	Increased Somewhat	Increased Greatly	N/A
Your cigarette smoking	1.3%	3.0%	12.1%	0.9%	0.6%	81.1%
Your use of smokeless tobacco	0.7%	1.1%	8.0%	0.3%	0.6%	88.0%
Your use of e-cigarettes	0.9%	0.9%	9.2%	1.3%	1.5%	84.7%
Your peers' use of tobacco products	3.8%	16.9%	25.5%	2.2%	1.1%	48.5%
Second hand smoke you are exposed to	18.3%	36.6%	20.9%	2.2%	1.4%	19.6%
Tobacco-related litter you see on campus	17.6%	36.0%	21.3%	2.6%	2.0%	19.2%

More than half of student respondents attributed reductions in secondhand smoke (54.6%) and tobacco-related litter (53.6%) on campus to the policy. Similar to findings from the 2014 faculty/staff survey, 3.6 percent of students felt that the policy had actually increased the amount of secondhand smoke they were exposed to on campus while 4.6 percent felt that it had increased the tobacco-related litter. Again, this is likely a result of these students' proximity to the newly created smoking areas on campus and/or a consequence of having to walk through smoking groups

congregating in parking lots or campus boundaries. While these are unintended, yet probably not unforeseen, consequences of the tobacco-free campus policy, the majority of students still reported reductions in these issues.

Respondents for the 2014 student survey were also asked about their perspective regarding policy compliance and enforcement. The majority of respondents believed that ASU campuses should remain 100% tobacco-free (76.1% *somewhat to strongly agree*). However much like staff and faculty, a large proportion of respondents felt that there should be designated smoking areas on campus to accommodate tobacco users (58.2% *somewhat to strongly agree*). Respondents generally reported that tobacco-free signage was readily noticeable (74.7% *somewhat to strongly agree*); however, there are concerns about whether the signage is effective in deterring tobacco use (52.1% *neither disagree nor agree to strongly disagree*). Moreover, the majority of the sample readily opposed confronting someone who was violating the policy and asking them to stop (58% *somewhat disagree to strongly disagree*).

Table 11. Agreement with policy compliance measures?

	Strongly Agree	Agree	Somewhat Agree	Neither	Somewhat Disagree	Disagree	Strongly Disagree
Our campus should remain 100% tobacco free	61.7%	8.9%	5.5%	6.9%	3.8%	3.4%	9.0%
There should be designated smoking areas on campus	23.5%	17.1%	17.6%	12.6%	5.6%	7.7%	15.0%
If I saw someone on campus using tobacco, I would ask them to stop	6.0%	5.4%	10.2%	19.4%	11.8%	20.4%	25.8%
I notice the tobacco-free policy signs	27.0%	28.6%	19.1%	9.8%	5.7%	5.2%	3.4%
The tobacco-free signage on campus is effective	9.7%	16.7%	20.4%	20.4%	12.4%	9.8%	9.5%

Enforcement

Student respondents provided a number of recommendations to enhance compliance and enforcement (Figure 4). Most respondents felt that some procedure to improve enforcement was needed (77%). As with the faculty/staff survey, the most frequently selected technique was to give warnings to violators of the policy (45.1% endorsed this option), followed by issuing a small fine (39.5% endorsed this option) and reporting the violator to student conduct or a supervisor (27.1% endorsed this option).

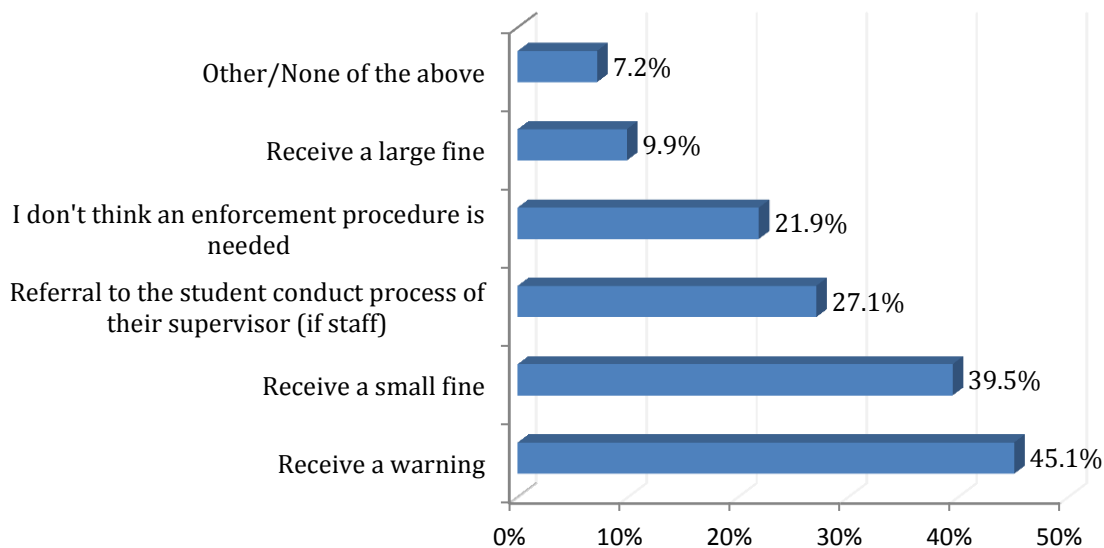


Figure 4. Student Recommendations for Policy Enforcement.

Student Qualitative Questionnaire

A total of 221 students completed an online qualitative questionnaire which asked about attitudes and behaviors about tobacco use and ASU's tobacco-free campus policy in greater detail (Table 12). The sample of participants included both users and non-users of tobacco products.

There were more perceived impacts of the tobacco-free campus policy on the Tempe campus than on other campuses, which was expected given that it is the largest of ASU's four campuses.

Among non-users of tobacco, the largest perceived policy effect was a decrease in smokers and secondhand smoke on campus, particularly in the main walkways and common areas. One student also stated that whereas before the policy new students would start smoking just because other students did and they joined them on their breaks, since the policy, "no one new starts smoking."

Many students, mostly non-users, also reported that the overall campus environment had improved as a result of the policy. Students reported feeling that the campus was cleaner and healthier now. One student stated: "[The policy] has allowed me to take my ailing sister to visit our campus. [She] has Cystic Fibrosis and the smell of smoke will send her right to the hospital." Another student stated: "I am a childhood cancer survivor....The policy puts 'right' on my side....I feel that I have the right to stand up for my own health." An asthmatic student also reported that he no longer has to move due to smoke.

Tobacco users, however, felt that the largest impact of the policy was that it led to a less friendly campus characterized by more interpersonal conflict. Smokers reported feeling "harassed"; one even reported a physical altercation: "I got sucker punched and knocked out by another student I never met over a cigarette."

Table 12. Student Online Questionnaire Findings: Main Effects of Tobacco-Free Campus Policy.

Main Policy Effects	Non-Users (n=166)				Users (n=55)	
	Tempe (n=119)		Other Campuses (n=47)			
Fewer smokers/less SHS	59	50%	14	30%	10	18%
Better campus environment (cleaner/healthier)	29	24%	7	15%	4	7%
No change	17	14%	9	19%	7	13%
Less friendly campus/more interpersonal conflict	10	8%	2	4%	17	31%
More litter	5	4%	0	0%	5	9%
Increase in tobacco awareness	5	4%	2	4%	1	2%
More smokeless tobacco and/or e-cig use	1	1%	1	2%	3	6%
Moved or hidden smokers	15	13%	4	9%	11	20%
Smoky boundaries	9	8%	2	4%	1	2%
Helped quit	3	3%	0	0%	1	2%

Many students, users and non-users, also reported that the policy has simply shifted where people smoke. More smokers are finding hidden areas, such as behind buildings and in stairwells, to smoke, and there are more people smoking at the boundaries of campus. One student stated: “[it] now feels like you have to penetrate a ring of smoke to enter the school.”

Still, although the overall numbers look small, a few students reported that either they or one or more of their friends had been motivated to quit smoking as a result of the policy. Some interesting quotes included:

- “[I] know at least one person who stopped smoking because of this policy.”
- “For students who do smoke...it has perhaps provided an aid to help them quit [as they are] not constantly walking through clouds of [secondhand smoke] tempting them to smoke.”
- “The fact that I cannot smoke on campus has prompted me to see help in a smoking cessation program as well as being conscientious about my smoking in public places.”
- “I’ve tried quitting for a while, so this somewhat facilitated that.”
- “I quit smoking June 2013 because I knew ASU was smoke free and used the change as a kick in the butt to quit.”

While one smoker did not specifically report being motivated to quit, s/he did say, “I always feel self-conscious about smoking – like those who see me are judging me,” which may indicate that campus norms surrounding tobacco use have begun changing as well.

The main things about the policy that non-users do not like include (*=most common):

- Inadequate enforcement/peer enforcement*
- People ignore the policy/non-compliance*
- More smoking in parking lots and at campus boundaries
- Takes away personal freedoms/it is not the university's place or job
- Policy has been inadequately communicated/advertised
- Creates negative feelings and interpersonal conflict
- Smokers, especially those in the campus interior, need somewhere to go smoke
- Should it cover e-cigarettes as well? (confusion about this issue)

There was some overlap in the negative policy aspects perceived by tobacco users and non-users, but the main emphases differed somewhat. Tobacco users, particularly those who smoke cigarettes, did not like:

- Takes away personal freedoms/it is not the university's place or job*
- No designated smoking areas*
- Inadequate and unclear enforcement procedures
- Unclear boundaries to which the policy applies
- Policy is unfair to smokers – smokers get harassed and nonsmokers now feel better than smokers
- No outreach to smokers prior to policy implementation

Nonetheless, tobacco users did mention some positive aspects of the policy, including:

- Cleaner air
- Protects non-smokers
- Less litter
- Good intentions (health promotion)
- Helps smokers be more aware of their surroundings
- Helps them smoke less daily and sometimes encourages them to quit

Relatively few users reported that the policy had had a significant impact on their tobacco use on campus, but those who did mentioned that it either reduced their use or helped them fight back urges to smoke, and that they at least now move away from non-smoking students to smoke. No students reported that the policy had an impact on their smoking off-campus.

In general, tobacco users reported that they consumed less tobacco when they are busy, less stressed, or hanging out with non-smokers, and that designated smoking areas would help improve their compliance with the policy. In fact, designated smoking areas was the most common policy recommendation among tobacco users, while better enforcement was most suggested by non-users.

ASU Staff Focus Group

Six ASU staff members (50% female, average age 43.8 years) participated in a focus group in June 2014. The purpose of the focus group was to further explore tobacco use behaviors and to expand upon staff and faculty survey results regarding attitudes and recommendations about the tobacco-free campus policy. All participants were White, non-Hispanic self-reported current smokers and

most had worked at ASU for more than 5 years. The following is a summary of the key focus group questions and participant responses:

Do you or others you know take smoke breaks while on campus? If so, where do these breaks take place?

Participants reported taking smoke breaks off campus if they were close enough, but those further away from campus boundaries also reported taking breaks behind dumpsters, in stairwells, and behind buildings. They reported that students appear to take smoke breaks primarily in what they call smoking “lounges” on campus, which include Parking Structure #1 on the Tempe campus, and the Hayden Library entrance and “moat”. The latter location appears to cause a particular problem as the smoke often flows through the vents into the library, bothering individuals inside.

What do you think ASU's reason was for implementing this policy?

Participants provided a wide range of perceived reasoning behind ASU’s tobacco-free campus policy. Some believed the policy was a result of staff and student advocacy efforts. Others believed it was tied in to broader ASU health and wellness efforts, or that ASU wanted to reduce problems associated with tobacco use such as burns and asthma. One participant also reported hearing that there was funding attached to becoming a smoke-free campus and that this was probably the primary reason the policy was implemented.

What do you like or not like about the policy?

Participants liked that the tobacco-free campus policy was a good influence on health and smoking habits. They believed that it encouraged smokers to take fewer breaks and to smoke less on campus as the policy makes smoking less convenient and less socially accepted among college students. They also reported appreciating that the campus environment was cleaner and fresher smelling with fewer smoking clusters and a reduced likelihood of being burned during walks through campus.

However, the biggest complaint about the policy relates to enforcement. The peer enforcement mechanism leads to confrontational situations and interpersonal conflict among ASU staff and students. Participants reported hearing about or being directly involved in physical confrontations when attempting to enforce the policy among violators. Additionally, they expressed concern that peer enforcement changes the dynamics of the relationship between faculty and students from one of support and guidance to one of policing and conflict, which strains faculty-student relationships and can thus inhibit student learning.

Other negative aspects of the policy reported by participants are listed in Table 13.

How effective do you think this policy could be in encouraging people to quit smoking and/or using other tobacco products?

Participants believed that the policy had a limited effect on encouraging smokers to quit and that it had no impact in their off-campus behavior, but did report that the policy might reduce the overall number of cigarettes/tobacco products consumed.

Table 13. Summary of Staff Focus Group Participant Attitudes about the Tobacco-Free Policy.

Pros	Cons
Makes habit less convenient	Enforcement policy leads to interpersonal conflict and confrontational situations
Good influence on health/habits	Changes dynamics of the relationship between faculty and students
Limits smoking as an accepted social habit among college students	More litter in certain areas because ashtrays were removed
Results in a cleaner campus (less litter and smoke in the air)	It stigmatizes smokers without providing any protections
Fewer burns	Safety issues – smokers are harassed at campus boundaries and are in the way of pedestrians, bicyclists and skateboarders on many sidewalks at the edge of campus
Smokers take fewer breaks because smoking is less convenient	Limits the stress management strategies available to staff and students, especially since the policy bans all tobacco products
Fresher smell on campus	Does not respect cultural differences in smoking acceptance and behavior
Fewer smoking clusters	

Compliance/enforcement

Participants suggested that policy non-compliance should be considered more of an issue on campus thoroughways than near campus boundaries or in out-of-the-way areas and that efforts to enhance compliance should place a special focus on known problem areas. They reported that policy compliance would likely increase if the following policy changes were implemented: designated smoking areas offered to give smokers an acceptable option other than non-compliance; increased enforcement or penalties such as conduct sanctions or litter clean-ups as opposed to community led enforcement; and/or a designated person or presence to visually deter smoking. They believed the latter would serve as a visual reminder not to smoke and would change norms over time.

Participants further suggested examining why smokers congregate in the places that they do as well as perceived versus actual campus boundaries. Perhaps smokers do not actually know what areas apply.

Is there anything else about the ASU tobacco-free campus policy you would like to share?

Additional concerns expressed by focus group participants included the following:

- The policy may have forced smoking indoors where it is more hidden and hard to address the behavior.
- Pot smokers and cigarette smokers are now grouping together to hide their behaviors which may lead to cross-over behaviors and increase public pot smoking.

- Who is the focus of the policy? Is it supposed to primarily benefit smokers or others? Alternatives for smokers are not necessarily safer.
- The policy was implemented using a top-down approach without requesting widespread ASU community feedback.
- Secondhand smoke is less harmful in the open air than in confined spaces where many smokers now must go to smoke.
- Tobacco use is a legal rather than criminal practice.
- ASU is a state institution – shouldn't it abide by the same laws as other state entities?
- Is there federal funding tied to the tobacco-free campus policy? If so, at least be honest about it.
- A 15-minute break is not long enough for smokers with long walks to campus boundaries.
- There is no action taken by administrators on the other end of the call number listed on tobacco-free signs.
- It is not the staff or ASU community's job to enforce the policy; this only leads to conflict.
- There are uncertain boundaries under which the policy applies.
- ASU has a dry campus policy – are the requirements for that and for tobacco the same?

What recommendations do you have for ASU's tobacco-free campus policy?

In addition to designated smoking areas, particularly in the middle areas of campus further from campus boundaries, and increased enforcement, such as in the Walk-Only zones on campus, participants recommended enhanced signage to indicate exact locations of campus boundaries and what is included in the ban. They also agreed that more noticeable signs than those currently on campus would be harder to ignore. They further requested that ASU administration be more responsive to complaints of policy violations as current complaints filed seem to be largely ignored. Participants suggested creating a mobile “app” that could be used for reporting violators and tracking hot spots.

Tobacco-related Litter in the ASU Environment

Based on data collected from ASU Facilities and Maintenance Department key informants and the groundskeeper focus group, SIRC researchers were informed that ASU landscapers spend the beginning of each work day cleaning up trash and litter on campus, including tobacco-related litter. Therefore it was not surprising that relatively little litter was found directly on the sidewalks in high foot- and bicycle-traffic areas. As was to be expected, cigarette butts made up the vast majority of tobacco-related litter and they were most commonly found in the garden strips between sidewalks and public streets, on the edges of sidewalks (especially those along public streets), in flower beds, and in the grates surrounding trees. Clusters of tobacco litter were also observed in areas alongside construction zones and parking areas, as well as near many bus stops.

Tobacco-related litter was counted at three time points during this evaluation: Spring 2013, Fall 2013, and Spring 2014. By campus location, the total amounts of tobacco-related litter tallied in the observed areas are displayed in Appendix A.

It is important to note that because the various ASU campuses vastly differ in size and not all areas of each campus were observed, the amounts of litter listed cannot be directly compared. Amounts should serve only as a guide to show an increase or decrease in tobacco-related litter in the ASU environment upon follow-up.

As demonstrated by the tallied results, litter counts on each campus generally declined across each data collection point, anywhere from 32 percent to 82 percent. From Spring of 2013 to Spring of 2014, the Tempe campus saw a 34.7 percent reduction in tobacco-related litter, the Downtown campus saw a 73.8 percent reduction, the West campus saw a 77.7 percent reduction, and the Polytechnic campus saw a 79.4 percent reduction (from Fall 2013 to Spring 2014). Some of the largest percent decreases were noted on the Downtown campus, in particular around Taylor Place and on the Taylor Mall. These findings suggest that policy implementation may have had an influence on smoking behavior, and therefore the amount of smoking-related litter. Notably, the amount of tobacco-related litter increased slightly on the Tempe campus between the Fall of 2013 and the Spring of 2014 by little over one percent. This increase was the equivalent of five more pieces of litter. This is consistent with feedback gathered from an ASU Facilities representative who expected that tobacco-related litter might increase before it decreases upon implementation of the policy once cigarette ash urns are removed and with the roll out of soft enforcement (i.e., social enforcement without fines or sanctions).

Return on Investment

The strategy employed in this study to estimate the return on investment associated with the tobacco-free campus policy focused on the cost savings and other benefits generated by the policy (see Appendix B for the full Return on Investment report). The costs of implementing the policy were largely incurred during its initial implementation in 2013 and were documented in the previous report. No new actions or implementation strategies were undertaken this year.

The benefits of implementing the smoke-free campus policy can be grouped into two categories: 1) health benefits to employees and students 2) reduced healthcare costs.

Health Benefits

The primary source of health benefits generated by a tobacco-free policy is a reduction in smoking among ASU employees and students. The impact of workplace smoke-free policies on tobacco-use has been widely studied in the health literature. A meta-analysis of 57 evaluations of such policies was conducted by Hopkins et al. (2010). The authors found that tobacco-users exposed to a smoke-free policy experienced an increase in tobacco use cessation that was 6.4 percentage points higher than workplaces that did not have a smoke-free policy. Additionally, the authors found that smoke-free policies were associated with a median reduction of 2.2 cigarettes smoked per day among tobacco users.

The findings by Hopkins et al. apply to workplaces in diverse settings and can therefore be extended to ASU faculty and staff. The applicability to the student body, however, is more questionable because undergraduate students they are both younger and categorically different than the majority of the U.S. workforce. A study by Seo, Macy, Torabi and Middlestaff (2011) compared two smoke-free campus initiatives, Indiana University-Bloomington which adopted a smoke-free campus policy and Purdue University in West Lafayette which only limited smoking within 30 feet of facilities. The results found a significant 3.7 percentage point decrease in smoking prevalence among Indiana students and no change in the Purdue students. Additionally, among students that continued to smoke, the Indiana students showed a greater reduction in their amount

of smoking after the campus smoke-free policy was implemented. There were also significant benefits in the perceptions of smoking in terms of whether it was found to be socially acceptable.

In order to assess the impact of ASU’s tobacco-free campus policy on tobacco usage, the overall number of individuals that have either stopped smoking or who have reduced the number of cigarettes that they smoke daily was assessed. Estimates identified by Hopkins et al. (2010) on the impact of a smoke-free workplace for the faculty and staff and the results from Seo, Torabi and Middlestaff (2011) on the student response to tobacco-free policies were also incorporated in the evaluation.

Table 14 depicts the rates of smoking cessation among ASU faculty and staff among survey respondents in 2013 and again in 2014. In 2013, 11.9 percent of respondents, or 401 individuals, reported that they had smoked a cigarette in the prior 12 months. When the survey was repeated in 2014, only 335 respondents reported having smoked a cigarette in the last 12 months and the overall percentage dropped to 10.7 percent. The margin of error on these percentages shows that the difference across years is not statistically significant.

Table 14. Faculty/Staff Smoking Cessation Rates.

	2013	2014	95% C.E
Survey Respondents	3373	3133	
Respondents That Have Ever Tried Tobacco of Any Form	2171	1979	
Respondents That Have Smoked Cigarettes in the Last 12 Months	401	335	
Smokers That Have Not Had a Cigarette in the Last 30 Days	144	116	
Percent of Recent Smokers That Have Quit	35.9%	34.6%	± 1.7%
Percent of Respondents That Have smoked in the last 12 Months	11.9%	10.7%	± 1.1%
Percent Respondents that are Active Smokers	7.6%	7.0%	± 0.9%

Individuals who reported having smoked in the last 12 months, but not within the last 30 days, were categorized as having recently quit smoking. The 2013 survey found that 144 of the 401 individuals that had smoked in the last 12 months had gone at least 30 days without a cigarette. In 2014, of the 335 respondents that had smoked in the last 12 months, 116 had gone 30 days without smoking. Using the proportion of smokers that had quit for 30 days, the 2013 survey respondents had a quit rate of 35.9 percent while the 2014 respondents had a quit rate of 34.6 percent. While the quit rate is slightly lower in the later survey, the fewer number of smokers within the population has a larger overall impact.

There are less data available regarding the rate of smoking cessation among students. Table 15 depicts cigarette usage rates among the student survey respondents for 2013 and 2014. Overall usage rates for cigarettes are similar across years. A significant shift in smoking rates was not observed following the implementation of the tobacco-free campus policy.

Table 15. Smoking Rates among ASU Student Survey Respondents.

	2013		2014		95% C.E.	
	N	%	N	%	±	%
Never	929	60.6%	2282	61.4%	±	1.57%
In my lifetime, but not in the past 30 days	379	24.7%	914	24.6%	±	1.38%
In the past 30 days	226	14.7%	520	14.0%	±	1.12%
Total	1534	100.0%	3716	100.0%		

Survey results revealed an interesting finding relating to a reduced rate of students starting to smoke after they have been admitted to ASU. Table 20 displays the responses to two questions:

- 1) When was the last time you used cigarettes?
- 2) Did you use cigarettes before you came to ASU?

The combination of these two questions identifies the number of students that have started smoking while at ASU. One of the benefits of a tobacco-free campus is that it may help deter students from starting smoking cigarettes. When comparing survey respondents who started smoking after coming to ASU, but who have not smoked in the last 30 days, there is a drop from 11.4 percent to 5.6 percent from 2013 to 2014. This reduction suggests that fewer individuals started smoking intermittently after coming to ASU. The confidence intervals indicate that this difference is statistically significant. Applying this percentage to the overall student population suggests that as many as 4,200 fewer students may have tried smoking for the first time while at ASU in the year following the implementation of the tobacco-free campus policy.

Table 16. First Time Smokers.

When Was The Last Time You Smoked a Cigarette?	Smoked Before Coming To ASU	2013			2014		
		N	%	C.E	N	%	C.E
Never Smoked		929	60.7%	2.4%	2054	61.1%	1.6%
In the past 30 days	Yes	177	11.6%	1.6%	403	12.0%	1.1%
In the past 30 days	No	47	3.1%	0.9%	69	2.1%	0.5%
In my lifetime, but not in the past 30 days	Yes	202	13.2%	1.7%	644	19.2%	1.3%
In my lifetime, but not in the past 30 days	No	175	11.4%	1.6%	189	5.6%	0.8%
Total		1530			3359		

Note: Difference in the total count of respondents between Table 15 and Table 16 reflect the survey participants that dropped out after answering only one of the two questions.

Reduced Healthcare Costs

The improvements in health generated by the ASU's tobacco-free policy will also generate savings in Smoking-Attributable Healthcare Expenditures. These expenditures are primarily associated

with heart disease, lung and other cancers and chronic obstructive pulmonary disease. Sloan (2004) examined health and productivity costs borne by the smoker as well as social costs that are also borne by non-smokers. These cost estimates were recently updated by researchers at University of Arizona (Herman & Walsh, 2010). Their updated study reflected Arizona state tax burdens, state average wage rates and recent research on the impact of smoking on worker productivity. These cost estimates have been updated to 2013 dollars using the Consumer Price Index³ for the purposes of this evaluation (Table 17)⁴. The total estimated lifetime costs of a 24-year-old smoker amount to \$227,837.

Table 17. Lifetime cost of smoking for a 24-year-old smoker (male and female weighted average).

Cost component	Smoker	Smoker's family	Rest of society	Society as a whole
Cost of cigarettes themselves	\$13,435	\$0	\$0	\$13,435
Federal excise taxes on tobacco	\$2,026	\$0	(\$2,026)	\$0
State excise taxes on tobacco	\$2,286	\$0	(\$2,286)	\$0
Smoker's mortality	\$116,262	\$0	\$0	\$116,262
Smoker's disability	\$19,455	\$0	\$0	\$19,455
Smoker's medical care	\$1,697	\$0	\$3,365	\$5,062
Loss in smoker's earnings	\$31,025	\$0	\$0	\$31,025
Lost income taxes on earnings	\$0	\$0	\$5,908	\$5,908
Work loss (sick leave/absenteeism)	\$0	\$0	\$4,360	\$4,360
Other productivity losses	\$0	\$0	\$1,340	\$1,340
SSI outlays and benefits	\$5,826	(\$977)	(\$4,849)	\$0
Private pension outlays and benefits	\$7,880	(\$690)	(\$7,190)	\$0
Life insurance outlays and benefits	(\$10,248)	\$0	\$10,248	\$0
Spouse mortality (SHS)	\$0	\$29,804	\$0	\$29,804
Spouse disability (SHS)	\$0	\$1,390	\$0	\$1,390
Infant deaths (SHS)	\$0	\$813	\$0	\$813
Medical care (SHS)	\$0	\$985	\$0	\$985
Totals	\$189,643	\$31,324	\$8,870	\$229,837

This aggregate cost estimate can be applied to the estimated reduction in the number of ASU students that have tried cigarettes since coming to ASU, but have not had a cigarette in the last 30 days (i.e., 4,200). Among those individuals that start out as light or intermittent smokers, after two years over a quarter of them become heavy smokers (White et al., 2009). The rest either give up smoking or remain light or intermittent smokers. If it is assumed that 25 percent of the 4,200 smokers that were deterred from trying cigarettes for the first time eventually became heavy

³ Medical costs were adjusted by the U.S. city average for medical care. The weighting factor to convert from 2009 dollars to 2013 dollars was 1.1318. All other goods were adjusted using the West Urban regions CPI index. This adjustment factor was 1.077.

⁴ The numbers on Table 17 correspond to Table 1 on page 4 of Hernan, P and Walsh M. *The Value of Smoking Prevention: An Estimate of the Dollar Value of Preventing One Otherwise-Smoker from Starting*. Arizona Department of Health Services, Bureau of Tobacco and Chronic Disease Online: <http://azdhs.gov/tobaccofreeaz/reports/pdf/2009-value-of-smoking-prevention-u-of-a-report.pdf>

smokers, then they would each have ultimately incurred the \$229,837 in social costs associated with a lifetime of smoking. This would result in an aggregate present value cost of \$241,328,850⁵.

This estimate is an upper bound on the lifetime cost savings associated with the tobacco-free policy. A significant limiting factor is lack of understanding of the causal link between the reduction in individuals starting smoking for the first time after enrolling at ASU and the campus tobacco ban. At this point it is not clear how many of these individuals chose not to try cigarettes because of the tobacco ban. Given that the entire costs of implementing the program totaled roughly \$80,000 (see 2013 evaluation report for details on implementation costs), if even one individual had been influenced by the policy the lifetime return on investment of this program would have been on the order of 280 percent.

Another potential source of cost savings associated with the tobacco-free policy is reduced cigarette use among ASU faculty and staff. A recent study attempted to estimate the excess costs of smoking borne by employers. These include absenteeism, smoking breaks, healthcare costs and pension benefits. They obtain an estimated average increased cost of \$5,816 per employee for the employer (Berman et al., 2013). One critic of this estimates argues, however, that the costs associated with taking regular smoke breaks is possibly inflated as recent worker productivity research has shown that regular breaks can help improve creativity and health and therefore may mitigate some of the health costs associated with smoking (Gee, 2013).

This survey found slightly lower rates of cigarette use among faculty and staff survey respondents in the year following the implementation of the tobacco ban, but these differences were too small to be statistically meaningful. Additionally, one of the variables included in this evaluation is the reported reasons why current smokers (both students and faculty/staff) had quit or were planning to quit in the near future. Among several possible factors including health, family concern, and social acceptability was the inconvenience of smoking. It was expected that the need to leave campus in order to smoke would increase the inconvenience of smoking and become a greater factor in individuals' decision to quit. This evaluation found no significant differences, however, in the frequency that this factor was reported across the two survey periods. It is concluded that a tobacco-free policy does not appear to increase the "ordeal" associated with smoking and therefore incentivize individuals to quit. These evaluation results do not indicate any significant cost savings to ASU due to changes in faculty and staff tobacco use that can be attributed to the tobacco ban.

Study Conclusions

Campus tobacco-free policies have been found to be effective approaches to reducing tobacco use among employees and students in a variety of settings. A broad research literature exists that supports the potential effectiveness of ASU's policy. In general, survey results demonstrated that the majority of students, staff, and faculty supported a tobacco-free campus, and a smaller proportion of smokers indicated that the policy had some influence in reducing their tobacco use. Furthermore, significant reductions in perceived levels of tobacco-related litter and secondhand smoke were reported following implementation of the policy. Tobacco litter counts by SIRC researchers support these perceptions as well. Survey data revealed that at this point the most visible change in actual smoking behavior that coincides with ASU's adoption of the policy is a significant reduction in students trying cigarettes for the first time following their enrollment in ASU. The lifetime cost savings due to this change alone would justify the adoption of the policy.

⁵ $\$229,837 \times 4,200 \times .25 = \$241,328,850$

However, despite benefits noted by participants in the evaluation, concerns remained related to the compliance and enforcement of the policy. Responses from the staff focus group and student qualitative questionnaire highlighted skepticism that the soft enforcement (i.e., social norming) procedures for the policy are not optimal, especially considering many respondents are unwilling or worried about confronting violators of the policy themselves. Many feel stronger methods, such as the involvement of authorized ASU personnel in issuing warnings or fines, would be more effective.

Next Steps

This report summarizes initial evaluation results of the ASU tobacco-free campus initiative. Included in the report is a discussion of potential policy impacts and influences from a combination of quantitative and qualitative data collection methods with participating ASU students, faculty, and staff. As the policy has only recently been implemented in August 2013, these evaluation results truly reflect short-term findings of the policy's effectiveness. Thus, the following next steps are recommended to more fully gauge the impact of the policy:

- **Continue to conduct student and faculty/staff surveys on an annual basis**
As the impacts of policies generally take time to be realized, it will be important to continue the assessment of student, staff, and faculty tobacco-related attitudes, beliefs, and behaviors over time and to evaluate whether quitting and/or smoking deterrence are attributable to the implemented policy.
- **Comprehensive assessment of motivations to quit smoking and other tobacco product use**
Further study of the way the tobacco ban influences individuals' perceptions and motivations to quit smoking is recommended. In particular, with soft enforcement procedures in place it will be important to assess the degree to which the policy makes tobacco use inconvenient and potentially stigmatizing.
- **Reconsider alternative enforcement strategies**
It is recommended that ASU policymakers review concerns and suggestions raised by study participants with respect to compliance and enforcement of the policy. Many are skeptical of the soft enforcement strategy and are further wary of confronting policy violators without ASU authority to do so. Working closely with departmental representatives across each campus will also help ensure that important stakeholders buy-in not only to the policy, but to its implementation and enforcement.
- **Continue to monitor participation in tobacco cessation and education programs at ASU**
It will be important to understand the level of access to these programs in order to parse out their influence compared with the influence of the tobacco use ban on all ASU campuses. It is possible as well that an increase in tobacco cessation programs participation at ASU may be an indicator of policy effectiveness.

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Appendix A

Tobacco-related Litter Counts by Date, Time, and Campus

Table A1. Tobacco-Related Litter Counts by Location and Date/Time of Tally.

TEMPE CAMPUS: (Pre to Post 1 Δ = -35.52%; Pre to Post 2 Δ = -34.66%; Post 1 to Post 2 Δ = +1.34%)		
Spring 2013 (Pre) Tuesday, April 30, 2013	Fall 2013 (Post 1) Monday, October 28, 2013	Spring 2014 (Post 2) Weds & Fri, April 23 & 25, 2014
Cady Mall (Lemon St. to University) <ul style="list-style-type: none"> • 236 cigarette butts • 16 smokers • 27 ashtrays; 16 permanent/built into landscape 	Cady Mall (Lemon St. to University) <ul style="list-style-type: none"> • 233 cigarette butts • Majority on North and South ends of the mall • Sidewalks along city streets not included • No smokers, ashtrays or designated smoking areas sighted 	Cady Mall (Lemon St. to University) <ul style="list-style-type: none"> • 209 cigarette butts • Majority at North entrance on University & College • 1 smoker walking onto campus from Lemon St. • 4 pieces of tobacco-related trash
Forest Mall (University to Gammage Pkwy) <ul style="list-style-type: none"> • 344 cigarette butts • 13 smokers • Sidewalks along city streets not included 	Forest Mall (University to Gammage Pkwy) <ul style="list-style-type: none"> • 141 cigarette butts • No smokers • Sidewalks along city streets not included 	Forest Mall (University to Gammage Pkwy) <ul style="list-style-type: none"> • 162 cigarette butts • 1 smoker walking onto campus from University • 4 pieces of tobacco-related trash • More in planters and bushes • Most near University Dr.
Total = 580 tobacco-related litter products + 29 smokers	Total = 374 tobacco-related litter products + 0 smokers	Total = 379 tobacco-related litter products + 2 smokers
DOWNTOWN CAMPUS: (Pre to Post 1 Δ = -32.88%; Taylor Place & Taylor Mall only: Δ = -57.41%; Pre to Post 2 Δ = -73.76%; Taylor Place & Taylor Mall only: Δ = -81.04%; Post 1 to Post 2 Δ = -60.91%)		
Spring 2013 (Pre) Tues-Weds, April 23-24, 2013	Fall 2013 (Post 1) October 31 & November 4, 2013	Spring 2014 (Post 2) Thursday, April 17, 2014
Mercado <ul style="list-style-type: none"> • Perimeter (building to curb): 189 cigarette butts <ul style="list-style-type: none"> ◦ No designation made between street side and building side • Through campus: 33 cigarette butts • Most litter found in flowerbeds and in grates around trees • No smokers sighted • Total = 222 cigarette butts 	Mercado (Thurs, 10/31/2013) <ul style="list-style-type: none"> • Perimeter: 286 cigarette butts <ul style="list-style-type: none"> ◦ 82 on ASU property (alongside buildings) ◦ 204 on city property (street-side) • Through campus: 13 cigarette butts • Most litter found in tree beds and garden areas • No smokers or ash trays sighted • Total = 299 cigarette butts 	Mercado <ul style="list-style-type: none"> • Perimeter: 104 cigarette butts <ul style="list-style-type: none"> ◦ 52 on ASU property (alongside buildings) ◦ 52 on city property (street-side) • Through campus: 5 cigarette butts; 1 other piece of tobacco-related trash • Most litter found in tree beds and garden areas • No smokers or ash trays sighted • Total = 109 cigarette butts; 3 pieces of tobacco-related trash
UCENT <ul style="list-style-type: none"> • Former designated smoking area (between UCENT and parking garage) & upper level of parking garage (top floor) combined <ul style="list-style-type: none"> ◦ 140 cigarette 	UCENT (Monday, 11/4/2013) <ul style="list-style-type: none"> • Former designated smoking area <ul style="list-style-type: none"> ◦ 145 cigarette butts ◦ Half of area fenced off for construction 	UCENT <ul style="list-style-type: none"> • Former designated smoking area <ul style="list-style-type: none"> ◦ 51 cigarette butts • Upper level of parking garage (top floor)

<ul style="list-style-type: none"> butts/tobacco-related products ○ 2 people smoking ○ 6 ashtrays 	<ul style="list-style-type: none"> • Upper level of parking garage (top floor) <ul style="list-style-type: none"> ○ 72 cigarette butts • Total = 217 cigarette butts <ul style="list-style-type: none"> ○ Could be higher due to construction workers and missing ashtrays for smokers to use 	<ul style="list-style-type: none"> ○ 13 cigarette butts • No cigarette butts in stairwells of garage • Total = 64 cigarette butts; 0 smokers
Taylor Place Perimeter (Tuesday 4/23/2013) <ul style="list-style-type: none"> • 920 cigarette butts/tobacco-related products • 8 people smoking • 3 ashtrays 	Taylor Place Perimeter (Monday, 11/4/2013) <ul style="list-style-type: none"> • 442 cigarette butts/tobacco-related products • 3 people smoking 	Taylor Place Perimeter <ul style="list-style-type: none"> • 188 cigarette butts; 2 other tobacco-related products • 0 people smoking
Taylor Mall (between UCENT & Cronkite) <ul style="list-style-type: none"> • 193 cigarette butts/tobacco-related products • 10 people smoking • 2 ashtrays 	Taylor Mall (between UCENT & Cronkite) <ul style="list-style-type: none"> • 32 cigarette butts 	Taylor Mall (between UCENT & Cronkite) <ul style="list-style-type: none"> • 21 cigarette butts • Mostly in planters
Total = 1,475 tobacco-related litter products + 10 smokers	Total = 990 tobacco-related litter products + 3 smokers	Total = 387 tobacco-related litter products + 0 smokers
WEST CAMPUS: (Pre to Post 1 Δ = - 54.64%; without Casa B: Δ = -50.35%; Pre - Post 2 Δ = -77.74%; without Casa B: Δ = -71.14%; Post 1 - Post 2 Δ = -50.93%)		
Spring 2013 (Pre) Tues-Weds, April 23-24, 2013	Fall 2013 (Post 1) Monday, November 4, 2013	Spring 2014 (Post 2) Thursday, April 24, 2014
Verde Mall <ul style="list-style-type: none"> • Faculty-admin annex to dining pavilion <ul style="list-style-type: none"> ○ 37 cigarette butts/products ○ 5 ashtrays • Dining Pavilion west to La Casas Residence Hall <ul style="list-style-type: none"> ○ 203 cigarette butts/tobacco-related litter • Total = 240 tobacco-related litter products 	Verde Mall <ul style="list-style-type: none"> • Faculty-admin annex to dining pavilion <ul style="list-style-type: none"> ○ 15 cigarette butts • Dining Pavilion west to La Casas Residence Hall <ul style="list-style-type: none"> ○ 44 cigarette butts/tobacco-related litter • Total = 59 tobacco-related litter products 	Verde Mall <ul style="list-style-type: none"> • Faculty-admin annex to dining pavilion <ul style="list-style-type: none"> ○ 8 cigarette butts; 1 piece of other tobacco trash • Dining Pavilion west to La Casas Residence Hall <ul style="list-style-type: none"> ○ 23 cigarette butts • Total = 32 tobacco-related litter products
Wood Drive <ul style="list-style-type: none"> • 492 cigarette butts/tobacco-related products • 1 person smoking 	Wood Drive <ul style="list-style-type: none"> • 213 cigarette butts • 0 people smoking 	Wood Drive <ul style="list-style-type: none"> • 47 cigarette butts • 0 people smoking
La Casas Residence Hall <ul style="list-style-type: none"> • Casa A Perimeter & Courtyard: 147 cigarette butts/products + 1 ashtray • Casa B Perimeter (not including courtyard): 298 cigarette butts/tobacco-related litter + 3 ashtrays • Parking lot (perimeter closest to buildings): 126 cigarette butts/products + 2 ashtrays • Total = 571 cigarette 	La Casas Residence Hall <ul style="list-style-type: none"> • Casa A Perimeter & Courtyard: 60 cigarette butts • Casa B Perimeter & Courtyard: 92 cigarette butts/tobacco-related litter • Parking lot (perimeter closest to buildings): 167 cigarette butts/products • Most tobacco-related litter found near benches/bus stop and near parking lots 	La Casas Residence Hall <ul style="list-style-type: none"> • Casa A Perimeter & Courtyard: 33 cigarette butts • Casa B Perimeter & Courtyard: 49 cigarette butts; 1 piece tobacco-related trash • Parking lot (perimeter closest to buildings): 128 cigarette butts • Most tobacco-related litter found in residence hall parking lot (no signs noticed); hardly any cigarette butts through

butts/tobacco-related litter	<ul style="list-style-type: none"> Total = 319 cigarette butts/tobacco-related litter 	<p>campus - very clean</p> <ul style="list-style-type: none"> Total = 211 cigarette butts/tobacco-related litter
Total = 1,303 tobacco-related litter products + 1 smoker	Total = 591 tobacco-related litter products + 0 smokers	Total = 290 tobacco-related litter products + 0 smokers
POLYTECHNIC CAMPUS: ($\Delta = -79.42\%$)		
Spring 2013 (Pre) Not Completed	Fall 2013 (Post 1) Friday, November 1, 2013	Spring 2014 (Post 2) Tuesday, April 22, 2014
	<p>Sonoran Arroyo Mall (Tweet St.-Terrapin Mall)</p> <ul style="list-style-type: none"> 518 cigarette butts/tobacco-related litter <p>Backus Mall (Sonoran Arroyo Mall-Sun Devil Mall)</p> <ul style="list-style-type: none"> 10 cigarette butts Caution tape surrounding courtyards on both sides of sidewalk due to newly fertilized grass <p>Sun Devil Mall (west end-Tweet St.)</p> <ul style="list-style-type: none"> 157 cigarette butts/tobacco-related litter 	<p>Sonoran Arroyo Mall (Tweet St.-Terrapin Mall)</p> <ul style="list-style-type: none"> 60 cigarette butts Tobacco-Free signs at both entry points to the mall Most at entries/edges of the mall <p>Backus Mall (Sonoran Arroyo Mall-Sun Devil Mall)</p> <ul style="list-style-type: none"> 47 cigarette butts Cluster in the rocks by the benches outside the Academic Center <p>Sun Devil Mall (west end-Tweet St.)</p> <ul style="list-style-type: none"> 33 cigarette butts; 1 piece tobacco-related litter Most outside the dining pavilion
	Total = 685 tobacco-related litter products + 1 smoker	Total = 141 tobacco-related litter products + 0 smokers

Note: UCENT = University Center.

Appendix B

Returns on Public Health Investments: Policy Impacts on Quitting Behavior and Tobacco Use Deterrence

Returns on Public Health Investments

Spencer Brian, Ph.D.

Introduction

There are many potential policy options available to local officials that can potentially reduce the rate of smoking. In a context of limited budgetary resources, however, it is important to identify the most effective strategies for reducing the costs associated with smoking. This section will discuss the results of a Return On Investment analysis of the Smoke-Free Campus policy adopted by ASU.

The strategy employed by this study to estimate the return on investment associated with the Tobacco-Free Campus policy will focus on the cost savings and other benefits generated by the policy. The costs of implementing the policy were largely incurred during its initial implementation in 2013 and were documented in the previous report. No new actions or implementation strategies were undertaken this year. The historical costs of this program remain at an estimate.

The benefits of implementing the smoke-free campus policy can be grouped into two categories: 1) health benefits to employees and students 2) reduced healthcare costs.

1) Health Benefits

The primary source of health benefits generated by a Tobacco-Free policy is a reduction in smoking among ASU employees and students. The impact of workplace smoke-free policies on tobacco-use has been widely studied in the health literature. A meta-analysis of 57 evaluations of such policies was conducted by Hopkins et al. (2010). The authors found that tobacco-users exposed to a smoke-free policy experienced an increase in tobacco use cessation that was 6.4 percentage points higher than workplaces that did not have a smoke-free policy. Additionally, 18 of the studies the authors reviewed examined reductions in the number of cigarettes smoked per day. The authors found that found that smoke-free policies were associated with a median reduction of 2.2 cigarettes smoked per day among tobacco users. The authors concluded that “[o]verall, the range of populations, communities, and individual worksites evaluated in these studies suggests that the findings on tobacco use among workers should be applicable to most worksites in the U.S. and elsewhere (pg. S282).”

The findings by Hopkins et al. apply to workplaces in diverse settings and can therefore be extended to ASU faculty and staff. The applicability to the student body, however, is more questionable because undergraduate students they are both younger and in a different place in their lives than the majority of the U.S. workforce. There have been studies of the impact of smoke-free campus policies at other universities that focus on the student response. A study by Seo, Macy Torabi and Middlestaff (2011) compared two campuses, Indiana University-Bloomington which adopted a smoke-free campus policy and Purdue University in West Lafayette which only limited smoking within 30 feet of facilities. Surveys were conducted on both campuses before and after IU-Bloomington adopted its policy. The results found a significant 3.7 percentage point decrease in

smoking prevalence among Indiana students and no change in the Purdue students. Additionally, among students that continued to smoke, the Indiana students showed a greater reduction in their amount of smoking after the campus smoke-free policy was implemented. There were also significant benefits in the perceptions of smoking in terms of whether it was found to be socially acceptable.

In order to assess the impact of ASU’s smoke-free campus policy on tobacco usage, we first estimate the overall number of individuals that have either stopped smoking or who have reduced the number of cigarettes that they smoke daily. We use the estimates identified by Hopkins et. al on the impact of a smoke-free workplace for the faculty and staff. We use the results from Seo, Torabi and Middlestaff on the response by students.

Table Appendix B.1 depicts the rates of smoking cessation among ASU faculty and staff among survey respondents in 2013 and again in 2014. In 2013 11.9 percent of respondents, or 401 individuals, reported that they had smoked a cigarette in the prior 12 months. When the survey was repeated in 2014, only 335 respondents reported having smoked a cigarette in the last 12 months and the overall percentage dropped to 10.7 percent. The margin of error on these percentages shows that the difference across years is not statistically significant.

Table Appendix B.1
Faculty/Staff Smoking Cessation Rates

	2013	2014	95% C.E	
Survey Respondents	3373	3133		
Respondents That Have Ever Tried Tobacco of Any Form	2171	1979		
Respondents That Have Smoked Cigarettes in the Last 12 Months	401	335		
Smokers That Have Not Had a Cigarette in the Last 30 Days	144	116		
Percent of Recent Smokers That Have Quit	35.9%	34.6%	±	1.7%
Percent of Respondents That Have smoked in the last 12 Months	11.9%	10.7%	±	1.1%
Percent Respondents that are Active Smokers	7.6%	7.0%	±	0.9%

In order to identify respondents that have recently quit smoking, the survey identifies individuals that have smoked in the last 12 months, but not within the last 30 days. The 2013 survey found that 144 of the 401 individuals that had smoked in the last 12 months had gone at least 30 days without a cigarette. In 2004, of the 335 respondents that had smoked in the last 12 months, 116 had gone 30 days without smoking. Using the proportion of smokers that had quit for 30 days, the 2013 survey respondents had a quit rate of 35.9% while the 2014 respondents had a quit rate of 34.6 percent. While the quit rate is slightly lower in the later survey, the fewer number of smokers within the population has a larger overall impact.

There is less data available regarding the rate of smoking cessation among students. Table Appendix B.2 depicts cigarette usage rates among the student survey respondents for 2013 and 2014. Overall usage rates for cigarettes are similar across years. We do not observe in the survey respondents a significant shift in smoking rates following the implementation of the smoke-free campus policy.

Table Appendix B.2 Smoking Rates Among ASU Student Survey Respondents.

	2013		2014		95% C.E.	
Never	929	60.6%	2282	61.4%	±	1.57%
In my lifetime, but not in the past 30 days	379	24.7%	914	24.6%	±	1.38%
In the past 30 days	226	14.7%	520	14.0%	±	1.12%
Total	1534	100.0%	3716	100.0%		

The surveys do reveal, however, an interesting finding relating to a reduced rate of students starting to smoke after they have been admitted to ASU. Table Appendix B.3 displays the responses to two questions:

- 3) When was the last time you used cigarettes?
- 4) Did you use cigarettes before you came to ASU?

The combination of these two questions identifies the number of students that have started smoking while at ASU. One of the benefits of a smoke-free campus is that it may help deter students from starting smoking cigarettes. When we look at survey respondents who started smoking after coming to ASU, but who have not smoked in the last 30 days, there is a drop from 11.4 percent to 5.6% between the two years. This reduction suggests that a lower proportion of individuals started smoking intermittently after coming to ASU. The confidence intervals indicate that this difference is statistically significant. Applying this percentage to the overall student population, suggests that approximately 4,200 fewer students tried smoking for the first time while at ASU in the year following the implementation of the smoke-free campus policy.

Table Appendix B.3 First Time Smokers

When Was The Last Time You Smoked a Cigarette?	Smoked Before Coming To ASU	2013			2014		
		N	%	C.E.	N	%	C.E.
Never Smoked		929	60.7%	2.4%	2054	61.1%	1.6%
In the past 30 days	Yes	177	11.6%	1.6%	403	12.0%	1.1%
In the past 30 days	No	47	3.1%	0.9%	69	2.1%	0.5%
In my lifetime, but not in the past 30 days	Yes	202	13.2%	1.7%	644	19.2%	1.3%

In my lifetime, but not in the past 30 days	No	175	11.4%	1.6%	189	5.6%	0.8%
Total		1530			3359		

Note: Difference in the total count of respondents between Table X.2 and Table X.3 reflect the survey participants that dropped out after answering only one of the two questions.

Some research does, however, highlight the limitations of smoke-free policies in reducing student smoking behavior. A recent study by White, Bray, Fleming and Catalano (2009) focused on the behavior of young adults recently out of high school. Binge drinking was found to be a significant predictor of transitions from non-smoking to smoking during young adulthood. A smoke-free policy does not address this factor that encourages young adults to take up smoking.

2) Reduced Healthcare Costs

The improvements in health generated by the ASU's Tobacco-Free policy will also generate savings in Smoking-Attributable Healthcare Expenditures. These expenditures are primarily associated with heart disease, lung and other cancers and chronic obstructive pulmonary disease. There have been many studies of the costs associated with smoking. One of the most extensive examinations of the social costs of smoking is found in Sloan (2004). That study examined health and productivity costs borne by the smoker as well as social costs that are also borne by non-smokers. Their cost estimates were recently updated by researchers at University of Arizona (Herman and Walsh, 2010). Their updated study reflected Arizona state tax burdens, state average wage rates and recent research on the impact of smoking on worker productivity. We have updated their cost estimates to 2013 dollars using the Consumer Price Index⁶. These cost estimates are found on Table Appendix B.4⁷. The present value of their total estimated lifetime costs of a 24-year-old smoker amount to \$227,837.

Table Appendix B.4 Lifetime cost of smoking for a 24-year-old smoker (male and female weighted average)

Cost component	Smoker	Smoker's family	Rest of society	Society as a whole
Cost of cigarettes themselves	\$13,435	\$0	\$0	\$13,435
Federal excise taxes on tobacco	\$2,026	\$0	(\$2,026)	\$0
State excise taxes on tobacco	\$2,286	\$0	(\$2,286)	\$0
Smoker's mortality	\$116,262	\$0	\$0	\$116,262

⁶ Medical costs were adjusted by the U.S. city average for medical care. The weighting factor to convert from 2009 dollars to 2013 dollars was 1.1318. All other goods were adjusted using the West Urban regions CPI index. This adjustment factor was 1.077.

⁷ The numbers on Table X.4 correspond to Table 1 on page 4 of Hernan, P and Walsh M. *The Value of Smoking Prevention: An Estimate of the Dollar Value of Preventing One Otherwise-Smoker from Starting*. Arizona Department of Health Services, Bureau of Tobacco and Chronic Disease Online: <http://azdhs.gov/tobaccofreeaz/reports/pdf/2009-value-of-smoking-prevention-u-of-a-report.pdf>

Smoker's disability	\$19,455	\$0	\$0	\$19,455
Smoker's medical care	\$1,697	\$0	\$3,365	\$5,062
Loss in smoker's earnings	\$31,025	\$0	\$0	\$31,025
Lost income taxes on earnings	\$0	\$0	\$5,908	\$5,908
Work loss (sick leave/absenteeism)	\$0	\$0	\$4,360	\$4,360
Other productivity losses	\$0	\$0	\$1,340	\$1,340
SSI outlays and benefits	\$5,826	(\$977)	(\$4,849)	\$0
Private pension outlays and benefits	\$7,880	(\$690)	(\$7,190)	\$0
Life insurance outlays and benefits	(\$10,248)	\$0	\$10,248	\$0
Spouse mortality (SHS)	\$0	\$29,804	\$0	\$29,804
Spouse disability (SHS)	\$0	\$1,390	\$0	\$1,390
Infant deaths (SHS)	\$0	\$813	\$0	\$813
Medical care (SHS)	\$0	\$985	\$0	\$985
Totals	\$189,643	\$31,324	\$8,870	\$229,837

This aggregate cost estimate can be applied to our previous estimates of a reduction in the number of ASU students that have tried cigarettes since coming to ASU, but have not had a cigarette in the last 30 days. Our extrapolation from the survey data to the wider student body suggests that following the implementation of the policy there was a reduction of approximately 4,200 fewer students that tried smoking for the first time since enrolling at ASU. Recent research by White et al. (2009) has focused on college-age young adults that engage in a pattern of light or intermittent smoking. Among those individuals that start out as light or intermittent smokers, after two years over a quarter of them become heavy smokers. The rest either give up smoking or remain light or intermittent smokers. If we assume that twenty-five percent of the 4,200 smokers that were deterred from trying cigarettes for the first time eventually became heavy smokers, then they would each have ultimately incurred the \$229,837 in social costs associated with a lifetime of smoking. This would result in an aggregate present value cost of \$241,328,850⁸.

This estimate is an upper bound on the lifetime cost savings associated with the smoke-free policy. A significant limiting factor is our limited understanding of the causal link between the reduction in individuals starting smoking for the first time after enrolling at ASU and the campus tobacco ban. At this point it is not clear how many of these individuals chose not to try cigarettes because of the tobacco ban. Given that the entire costs of implementing the program totaled roughly \$80,000, if even one individual had been influenced by the policy the lifetime return on investment of this program would have been on the order of 280%.

Another potential source of cost savings associated with the tobacco-free policy is reduced cigarette use among ASU faculty and staff. A recent study attempted to estimate the excess costs of smoking borne by employers. These include absenteeism, smoking breaks, healthcare costs and pension

⁸ \$229,837*4,200*.25 = \$241,328,850

benefits. They obtain an estimated average increased cost of \$5,816 per employee for the employer (Berman et al., 2013). One critic of this estimates argues, however, that the costs associated with taking regular smoke breaks is possibly inflated as recent worker productivity research has shown that regular breaks can help improve creativity and health and therefore may mitigate some of the health costs associated with smoking (Gee, 2013). Our survey found slightly lower rates of cigarette use among faculty/staff survey respondents in the year following the implementation of the tobacco ban, but these differences were too small to be statistically meaningful. Our current results do not indicate any significant cost savings due to changes in faculty/staff tobacco use that can be attributed to the tobacco ban.

Conclusions

Campus Tobacco-Free policies have been found to be effective approaches to reducing tobacco use among employees and students in a variety of settings. A broad research literature exists that supports the effectiveness of this study. Our survey data reveals that at this point the most visible change in smoking behavior that coincides with ASU's adoption of the policy is a significant reduction in students trying cigarettes for the first time following their enrollment in the University. The lifetime cost savings due to this change alone would justify the adoption of the policy.

We investigated several other elements of the effectiveness of the policy that do not directly factor into the ROI analysis. One of these included an assessment of the reported reasons why current smokers (both students and faculty/staff) had quit or were planning to quit in the near future. Among several possible factors including health, family concern and social acceptability was the inconvenience of smoking. It was our expectation that the need to leave campus in order to smoke would increase the inconvenience of smoking and become a greater factor in individuals' decision to quit. We found no significant differences, however, in the frequency that this factor was reported across the two survey periods. Our initial conclusion is that a Tobacco-Free policy does not appear to increase the "ordeal" associated with smoking and therefore incentivize individuals to quit. We recommend further study of the way the tobacco ban influences individuals' perceptions and motivations to quit smoking.

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