

# Estimating the cost of a smoking employee

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## ABSTRACT

**Objective** We attempted to estimate the excess annual costs that a US private employer may attribute to employing an individual who smokes tobacco as compared to a non-smoking employee.

**Design** Reviewing and synthesising previous literature estimating certain discrete costs associated with smoking employees, we developed a cost estimation approach that approximates the total of such costs for US employers. We examined absenteeism, presenteeism, smoking breaks, healthcare costs and pension benefits for smokers.

**Results** Our best estimate of the annual excess cost to employ a smoker is \$5816. This estimate should be taken as a general indicator of the extent of excess costs, not as a predictive point value.

**Conclusions** Employees who smoke impose significant excess costs on private employers. The results of this study may help inform employer decisions about tobacco-related policies.

Ohio-based Scotts Miracle-Gro and Michigan-based Weyco, Inc, have gone a step further and decided that they will no longer retain employees who do not quit smoking within a given period of time.<sup>5</sup> Without an accurate estimate of smoking-related costs, such policies may seem arbitrary or unreasonable. A well-reasoned estimate allows companies to more fairly analyse the costs and benefits of such 'tobacco-free workforce' policies.

## METHODOLOGY

Javitz *et al*<sup>6</sup> conducted what appears to be the most exhaustive review of the various costs that smoking employees impose on their employers. That review does not, however, estimate an overall sum of these costs. Chris Hallamore calculated such a sum for the Conference Board of Canada, but the Conference Board report is written for Canadian employers (who do not pay any healthcare costs) and ignores some of the other employer costs (such as 'presenteeism') discussed by Javitz.<sup>7</sup> Building upon these analyses and a review of other published research, this paper constructs a cost estimation approach for the excess costs incurred by a private-sector US employer for each employee who smokes. It considers excess absenteeism, presenteeism, lost productivity due to smoking breaks, excess healthcare costs and pension benefits.

Our analysis omits several other costs that employers may face as a result of hiring employees who smoke, such as higher workers' compensation costs and higher life and fire insurance premiums. We did not include these costs because they vary widely by industry and recent studies do not present reliable cost estimates. For example, although Musich *et al*<sup>8</sup> showed that workers' compensation costs were dramatically higher for smokers than for non-smokers among Xerox's employees, Boyce *et al*<sup>9</sup> found no statistically significant difference in workers' compensation claims between smoking and non-smoking police officers in Charlotte, North Carolina. In addition, we excluded facilities-related costs such as the cost of maintaining 'smoking huts' or installing ventilation systems. These costs are largely within the control of the employer, unlike the other major costs discussed in this paper, and they can be reduced or eliminated by employer policies (or state or local laws) requiring a smoke-free workplace. Our approach may underestimate the relevant costs as a result of omitting these considerations and others.

Table 1 summarises the findings of this paper. For each category of expense, we present our best estimate of an employer's costs, followed by a high range and a low range. As discussed in each subsequent section, we arrived at our estimates by surveying existing research and applying the high and low ranges of that research, as well as what we

## ESTIMATING THE COST OF A SMOKING EMPLOYEE

Smoking by employees costs businesses money. But just how much? Previous studies provide only very rough (and often inaccurate) estimates of the excess costs imposed by employees' smoking. For example, the Centers for Disease Control (CDC) estimates that smoking-attributable productivity losses and medical expenditures amount to approximately \$3400 per year for each adult smoker.<sup>1</sup> The CDC's report, however, looks only at the overall economy; its calculations of productivity losses and medical expenditures do not distinguish between costs borne by employers and those absorbed by others (the smokers themselves, insurance companies, taxpayers, etc.). Moreover, the CDC's study looks only at *mortality-related* productivity losses, that is, lost productivity caused by premature smoking-related deaths. Although smoking-attributable deaths surely reduce economic productivity in a general sense, the lost earning potential due to premature death is not an accurate reflection of an employer's costs. The CDC's figure thus provides a poor estimate for employers to use in gauging their own costs.

This paper estimates the average excess cost of a smoking employee (over a non-smoking employee) from a private employer's perspective. Such an estimate can provide important factual context to employer decisions about tobacco-related policies. Numerous employers have begun charging smokers higher premiums for health insurance,<sup>2</sup> and several large employers including Turner Broadcasting, Alaska Airlines, Union Pacific Railroad and a number of large hospital systems have decided to hire non-smokers only.<sup>3 4</sup> Other companies, such as

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**Table 1** Total annual excess cost of a smoking employee to a private employer

Category	Best estimate annual costs	High range	Low range
Excess absenteeism	\$517	\$576	\$179
Presenteeism	462	1848	462
Smoking breaks	3077	4103	1641
Excess healthcare costs	2056	3598	899
Pension benefit	(296)*	0	(296)*
Total costs	\$5816	\$10125	\$2885

\*For employers with defined-benefit pension plans.

considered to be 'best estimate' (either the average of previous research or a more conservative estimate). Where necessary, we then used standard government statistics to convert the findings of previous research into a per-employee cost. In some cases, this required an adjustment for inflation. All costs have been adjusted to 2010 levels using the U.S. Bureau of Labor Statistics' Consumer Price Index (CPI) inflation calculator. Because smokers are, on average, paid less than non-smokers, we have adjusted the average wage level used in our calculations. Following the findings of the Medical Expenditure Panel Survey, as reported by Cowan and Schwab,<sup>10</sup> we have discounted the average hourly wage reported by the U.S. Bureau of Labor Statistics by 15.6%.

Given our need to standardise and combine a range of studies that employed different methodologies, the results should be not taken as predictive point estimates. Rather, we believe our paper accurately shows the general range of costs that private employers who hire employees who smoke may bear. As discussed below, individual employers may adjust the calculations used in our cost estimation approach in order to better estimate their own costs.

### LOST PRODUCTIVITY DUE TO EXCESS ABSENTEEISM

Prior studies calculating workplace absenteeism due to smoking have come to surprisingly similar results. Some of these studies, while finding that smoking led to excess absenteeism, did not translate that finding into an average number of absences per year. For example, Robbins *et al* examined the records of nearly 90 000 U.S. Army personnel and concluded that 'current smoking was associated with a 60% increase in risk of lost workdays among men and a 15% increase in risk among women'.<sup>11 12</sup> The recent US studies that did compute average excess annual absences by smokers are summarised in table 2.

**Table 2** Estimates of annual excess absences

Author	Sample	Annual excess absences (smokers compared to never smokers)
Halpern <i>et al</i> <sup>22</sup>	300 airline reservation agents	2.6 (2 year average)
Tsai <i>et al</i> <sup>18</sup>	2203 Shell Oil Company employees	2.9
Bunn <i>et al</i> <sup>23</sup>	45 630 employees at 147 companies (voluntary self-reporting)	2.3

There are also a number of non-US studies that have looked at workplace absenteeism caused by smoking. These studies are not directly applicable to the US context, but are instructive nonetheless. These studies have all found an association between smoking and absenteeism, but have varied more widely in their calculation of the average number of excess absences. The variation appears to be due to national and cultural differences with regard to workplace absenteeism in general. For example, a study in Taiwan by Tsai *et al*<sup>13</sup> found that male smokers took off an average of 4.36 days, while male non-smokers missed only 3.3 days. Female smokers took off 4.96 days, while non-smoking women were absent 3.75 days. Thus, Tsai found an average of 1.03 excess days of absenteeism for male smokers and 1.21 days for female smokers. Taiwan, however, has extremely low rates of absenteeism, compared to the international average.<sup>13</sup> On the other end of the spectrum, Lundborg<sup>14</sup> looked at Swedish employees and found that smokers were absent 10.7 days more than never smokers. After controlling for health status and other risk factors, Lundborg concluded that smoking accounted for 7.7 days of excess absence per year. These results matched earlier studies in Sweden that found 7.6 days of excess absence for smokers.<sup>15</sup> Sweden, however, has the highest rate of absences in the Organisation for Economic Co-operation and Development countries, with an average of 25 absences per year, compared to nine in the USA.<sup>14</sup>

We compute the cost of excess absenteeism by taking the number of days of excess absenteeism for current smokers and multiplying by the number of hours worked during the day (7.5)<sup>15</sup> and the average wage and benefits paid to the employee (\$26.49). As noted above, the average wage is discounted by 15.6% to account for the lower average pay of current smokers (benefits are not discounted).<sup>10</sup> According to the Employee Benefit Research Institute, the average for wages and benefits paid by employers in 2010 was \$29.72.<sup>16</sup> The wage portion of that amount, \$20.71, is discounted by 15.6% to reach an average wage for an employee who smokes of \$17.48. Including benefits, the average hourly amount paid to an employee who smokes is estimated to be \$26.49. Using the lowest calculation of smoking-related absences in the USA—0.9 excess days in a dated 1991 study<sup>17</sup>—the average cost would be \$178.81. At the high end of the range, using the 2.9 days of excess absence calculated by Tsai *et al* in their US study,<sup>18</sup> the average cost would be \$576.16. In between those extremes, using an estimate of 2.6 days (the average of the recent US studies and slightly less than the estimate of excess absenteeism produced by a recent meta-analysis of US and international absenteeism studies<sup>19</sup>) would result in an average annual per-smoker cost of \$516.56 (box 1).

#### Box 1 Lost productivity due to excess absenteeism

- ▶  $Cost_{\text{AbsentSmokers}} = \text{Days Lost}_{\text{Smokers}} \times \text{Hours Worked} \times \text{Compensation Cost} = \$516.56$ .
- ▶  $Cost_{\text{AbsentSmokers}} = \text{Total annual per-employee cost due to increased absenteeism in smoking employees}$ .
- ▶  $\text{Days Lost}_{\text{Smokers}} = \text{Number of additional days of absenteeism taken by an average smoking employee compared to an average nonsmoking employee (2.6 days—the average of recent US studies)}$ .
- ▶  $\text{Hours Worked} = \text{Number of hours worked in a day (7.5)}$ .
- ▶  $\text{Compensation Cost} = \text{Average hourly wage and benefits paid to an employee who is a current smoker (\$26.49)}$ .

## LOST PRODUCTIVITY DUE TO PRESENTEEISM

Another cost to employers from smoking employees is ‘presenteeism’—lower on-the-job productivity that results from nicotine addiction. Though all employees are occasionally unproductive in one way or another, research suggests that smoking status negatively impacts productivity separately and apart from lost work time due to smoking breaks and absenteeism. This is because nicotine is a powerfully addictive drug. Although cigarettes satisfy a smoker’s need for nicotine, the effect wears off quickly. Within 30 min after finishing the last inhalation, the smoker may already be beginning to feel symptoms of both physical and psychological withdrawal.<sup>20</sup> (Much of what smokers perceive as the relaxing and clarifying effect of nicotine is actually relief from their acute withdrawal symptoms.) Now that the vast majority of workplaces are smoke-free, the repetitive, prolonged withdrawals that smoking employees suffer predictably diminishes their productivity at work.

Accurately measuring lost productivity due to presenteeism, however, is difficult. As Mattke *et al*<sup>21</sup> write, ‘Conducting such research is by no means a straightforward task, particularly in knowledge-based occupations’. Even when objective measures are used to compare the productivity of smokers and non-smokers, monetising the cost to the employer—especially in a way that would be relevant to different firms or different professions—remains problematic.<sup>22</sup> But although the specific amount of lost productivity remains difficult to determine, studies have consistently demonstrated that employees who smoke are less productive than employees who do not.<sup>22</sup>

Studies that have tried to quantify smoking-related presenteeism have, despite the imprecision of the evaluation tools, reached similar results. Bunn *et al*<sup>23</sup> reviewed more than 10 000 employee records from 147 US employers. They found that mean hours of lost productivity per year due to presenteeism were 76.5 h for a smoker compared with 42.8 h for a never smoker.<sup>23</sup> The excess presenteeism of 33.7 h/year equals approximately 1.9% of hours worked per year. Burton *et al* looked at a cohort of employees at a Midwestern financial services company and evaluated self-reported indicators of productivity. They concluded that smoking was associated with a 2.8% reduction in productivity.<sup>24</sup> Other estimates of lost productivity due to presenteeism range up to 4%.<sup>25</sup>

We compute the annual cost of smoker-related presenteeism by taking the percentage of lost productivity for current smokers and multiplying it by the cost of compensation per hour, hours worked per day and days worked per year. Estimates of smoker-related lost productivity range up to 4%, which would result in an annual per-smoker excess cost of \$1847.68. Averaging the results of the Bunn and Burton studies would result in an estimated smoking-related productivity loss of more than 2%. Nonetheless, due to the difficulties in measuring presenteeism, the possibility that employees may compensate for lost productivity, and the potential for employers to adjust for such costs (eg, by paying lower wages to less productive employees), we use a very conservative estimate of 1% for the productivity loss due to presenteeism. This results in an average annual cost of \$461.92 (box 2).

## LOST PRODUCTIVITY DUE TO SMOKING BREAKS

Productivity loss due to smoking breaks is by far the largest single cost that a private employer incurs from a smoking employee. Fortunately, it is a cost that can be completely eliminated by smoking cessation (unlike healthcare costs and absenteeism, for which former smokers will still have higher average costs than never smokers).

### Box 2 Lost productivity due to presenteeism

- ▶  $Cost_{Prod} = Excess\ Presenteeism\ Rate \times Compensation\ Cost \times Hours\ Worked \times Days\ Worked = \$461.92.$
- ▶  $Cost_{Prod} = Annual\ per\ employee\ cost\ due\ to\ loss\ of\ productivity.$
- ▶ Excess Presenteeism Rate (1%).
- ▶ Hours Worked: Number of hours worked during the day (7.5).
- ▶ Compensation Cost: Average hourly wage and benefits paid to an employee who is a current smoker (\$26.49).
- ▶ Days Worked: Number of days worked per year (232.5).

Previous studies have found that the amount of time lost to unsanctioned smoking breaks ranges from 8 to 30 min/day.<sup>6</sup> This number may vary substantially depending upon firm policy. As Javitz *et al*<sup>6</sup> state, ‘the number of lost minutes to the employer depends on the amount of flexibility that employees have concerning when they may smoke and when they may take their breaks’.

The Conference Board of Canada report estimated that employees smoke a majority of their daily cigarettes outside of work, with an average of five cigarettes consumed in an 8-h workday—three of those during sanctioned breaks.<sup>7</sup> This estimate is supported by studies focusing on smoking breaks that were conducted in Canada.<sup>26</sup> Since the number of cigarettes consumed per smoker in Canada (15.2)<sup>26</sup> and the USA (16.8)<sup>27</sup> is similar, the assumption that only two cigarettes are smoked in non-employer sanctioned times may be applied to the USA as well. Though the average amount of time spent by employees on smoking breaks is debatable (the Conference Board estimated 20 min), 15 min/cigarette break is a conservative estimate that matches employer estimates of time lost to smoking breaks.<sup>6</sup> As more and more US companies adopt smoke-free campus policies, requiring employees to leave the company’s property in order to smoke, the amount of time taken to consume each cigarette may increase.

We calculate the annual cost of lost productivity due to smoking breaks by taking the number of cigarettes consumed per day outside of employer sanctioned times, multiplying it by the amount of time it takes to consume each cigarette (adjusted as a fraction of an hour), the cost of the compensation per hour,<sup>16</sup> and the number of days worked. Assuming that only two cigarettes are smoked outside of sanctioned break times each day, and that it takes 15 min to smoke each cigarette, the annual per-smoker cost of lost productivity due to unsanctioned smoking breaks is \$3077.24. Using an estimate of 20 min/day, as estimated by the Conference Board of Canada, would result in a per-smoker cost of \$4102.85. Utilising the lowest available estimate of 8 min/day<sup>7</sup> would result in an annual cost of \$1641.14 (box 3).

## EXCESS HEALTHCARE COSTS

Smoking by employees, whether on or off the job, also leads to excess healthcare expenses. Estimating an average excess cost per smoking employee, however, is complex. Even assuming that an employer knows the smoking status of its employees, it is no simple task to estimate the increased costs that are attributable to smoking. The higher healthcare costs of smoking employees may be in part the result of other coexisting risk factors such as a poor diet, lack of exercise, or abuse of alcohol.

## Box 3 Lost productivity due to breaks

- ▶  $Cost_{Prod} = Cigarettes_{day} \times Time_{onbreak} \times Compensation \times Days\ Worked = \$3077.14.$
- ▶  $Cost_{Prod}$  = Annual per-employee cost due to loss of productivity.
- ▶  $Cigarettes_{day}$  = Average number of cigarettes smoked per day at work during non-sanctioned break periods (2).
- ▶  $Time_{onbreak}$  = Time (in hours) taken to travel to smoking area and consume each cigarette (0.25).
- ▶  $Compensation$  = Average hourly wage and benefits paid to an employee who is a current smoker (\$26.47).
- ▶  $Days\ Worked$  = Number of days worked per year (232.5).

In addition, many employees pay a substantial portion of their health insurance premium; although uncommon, employers may be able to reduce their share of excess smoking-related costs by requiring smoking employees (and dependents) to pay higher healthcare premiums.

Employer costs may vary depending upon whether the employer is self-insured or purchases private insurance. For employers who purchase private insurance, their responsibility for healthcare expenses ends when their share of health insurance premiums is paid. At that point, smoking-related illnesses do not produce an increase in healthcare costs for the employer. Nonetheless, an employer with *no* smoking employees could presumably obtain a discount in insurance premiums, due to the fact that the employee pool is likely to have lower overall healthcare costs. Correspondingly, health insurance premiums are higher for employers when there are more smokers in the labour force. However, there is no available data with which to measure the amount of excess premium costs on a per-smoker basis.

Our cost estimation approach therefore addresses only the excess healthcare costs of smoking employees for employers who self-insure. These businesses, which bear their own healthcare costs more directly, employ about 55% of private employees.<sup>16</sup> Although our approach may not produce as accurate an estimate if the employer is not self-insured, usually an employer's claims experience will eventually be reflected in that employer's health insurance premiums.

There are many studies focusing on the overall healthcare costs caused by smoking, although, as noted above, employers do not bear all of these costs. Warner *et al*<sup>28</sup> surveyed studies that estimated overall smoking-attributable healthcare expenditures. Their survey showed that estimates of the healthcare costs due to smoking ranged from 3.5% to 14% of all healthcare spendings.<sup>29</sup> Though the average conclusion of previous studies was that 6–8% of healthcare costs were due to smoking-related diseases, Warner *et al*<sup>28</sup> expressed their opinion that the correct percentage was likely higher.

More recent studies have produced somewhat higher estimates of the smoking-attributable fraction (SA%) of healthcare costs, due in part to the fact that these studies correct for some of the deficiencies noted by Warner *et al*. For example, Max *et al* studied the healthcare cost of smoking in California, which totalled approximately \$8.6 billion in 1999 (or \$1798.74 per smoker).<sup>12</sup> They concluded that smoking-related costs accounted for 11.4% of all healthcare costs for men and 8% of all healthcare costs for women. It should be noted, however, that smoking prevalence in California was (and is) lower than

## Box 4 Excess healthcare costs

- ▶  $Cost_{Ins} = (Employer\ Healthcare\ Expenditures \times Adjusted\ SA\ \%) / Smoking\ Private\ Employee = \$2055.77.$
- ▶  $Cost_{InsSmoker}$ : Cost of healthcare to self-insured private employers for each smoking employee.
- ▶ Employer Healthcare Expenditures: 2010 Total Healthcare Expenditures by Private Employers (\$534.5 billion).
- ▶ Adjusted SA%: Smoking Attributable Fraction of healthcare expenses (8%).
- ▶ Smoking Private Employee: Number of employees in private employment who smoke. (108 million  $\times$  19.3% = 20.8 million).

the national average. Other studies have estimated smoking-attributable costs to be significantly higher.<sup>29 30</sup>

We compute the annual cost (per smoking employee) of excess healthcare to a private employer by multiplying the total cost of healthcare to private employers<sup>31</sup> by the SA% and then dividing this total by the number of private employees who smoke in the workforce.<sup>32 33</sup> Using an SA% of 8%, this results in a total of \$2056. At the high end of scale, using a SA% of 14% results in a per-smoker cost of \$3598, while the lowest estimate of 3.5% results in \$899. Since most studies of the SA% cluster around 6–8% and older studies have tended to systematically underestimate the SA%, we believe that 8% is an appropriate figure to use (box 4).

## 'DEATH BENEFIT'

Some have argued that although smokers require higher average healthcare costs while alive, they incur fewer costs overall due to their shorter lifespan.<sup>34</sup> Though Philip Morris has played a role in popularising this theory, it turns out to be false. Rasmussen *et al*<sup>35</sup> confirmed that even though never smokers lived longer than current smokers, their lifetime direct and indirect healthcare costs were lower. In a separate study, they confirmed that quitting smoking leads to substantial savings in terms of both healthcare costs and overall economic productivity.<sup>36</sup>

The more pertinent question for this analysis is whether smokers' shorter life spans end up providing employers with a 'death benefit' because they receive fewer pension payments before death. Though in some cases this may occur, it could happen only in defined benefit plans. Under such an arrangement, the employer pays a set amount in pension each year, and thus an employee with a short postemployment lifespan may end up receiving less in benefits than he paid into the fund while employed. (By contrast, an employee with a long post-employment lifespan may end up receiving more in benefits than he paid into the system while employed.) Thus, smokers' contributions to the company's pension fund could theoretically end up subsidising the retirement benefits of non-smokers.

More and more employers, however, are moving away from defined benefit plans into defined contribution plans (such as 401(k)s).<sup>37</sup> In such plans, there is no potential for a 'death benefit' because the employee is entitled to all of the assets in the fund—no more and no less—regardless of life span. The employer may pay into the retirement fund during the course of employment, but it does not make annual payments after retirement.

Nonetheless, our cost estimate incorporates a 'death benefit' for those employers that still use defined benefit pension



systems. Sloan *et al*<sup>38</sup> calculated the subsidy that smokers provide to their employers through their use of the defined benefit plans. They found that on average, each male smoker subsidised non-smoker's pension plans by \$10 123, and each female smoker by \$383 (the variation is caused by the fact that, on average, women have lower pension wealth than men).<sup>39</sup> The Sloan study was based on self-reported data collected from more than 10 000 subjects for the Health and Retirement Study at the University of Michigan Institute for Social Research. Our research did not reveal any other recent studies that considered the impact of smoking on defined benefit plans in the USA.

Using Sloan's numbers, we estimate the 'death benefit' per smoker participating in a benefit plan by calculating the individual contributions of male and female<sup>39</sup> workers in the private sector to the subsidy, adjusting for inflation for 2010, and then annualising it by dividing the total over 24 years (the average number of years of employment<sup>38</sup>) for a total of \$295.50. Since, the amounts were already discounted by Sloan *et al*, no discounting was performed on these results. Again, it should be noted that only 21% of all private employers use defined benefit pension plans,<sup>40</sup> and an employer who does not have a defined contribution will not benefit from such a subsidy (box 5).

### EXCESS COSTS VERSUS MARKET COST

This paper examines only the excess costs of an employer hiring a smoker under the employer's existing benefits structure. However, these costs may be partially offset if smokers are paid lower average wages, as some research suggests that they are. Cowan and Schwab, for example, found that of workers with equivalent experience and occupation, a smoker enrolled with employer sponsored health insurance will earn less than the equivalent non-smoking worker insured through their employer, averaging \$1.72 less per hour or over \$3400 per year in lower wage income.<sup>10</sup> Our cost estimate suggests, however, that even if employers pay lower wages at the levels suggested by Cowan and Schwab to adjust for the cost of smoking employees, the lower wages will not fully compensate for the additional costs imposed.

### CONCLUSIONS AND LIMITATIONS

Building upon the work of Javitz *et al*, the Conference Board of Canada, and other previous studies, we have estimated that employers face an annual excess cost of approximately \$5816 for each employee who smokes. As noted above, this estimate

assumes that the employer is self-insured and maintains a defined benefit pension system. When these assumptions are incorrect, employers can adjust our cost estimate approach to more accurately predict their own costs (eg, by ignoring the excess cost for health insurance if they are not self-insured). We caution, however, that our review does not include all possible smoking-related costs. For example, employers may face higher maintenance costs as a result of permitting smoking on the premises. In addition, allowing smoking in the workplace may lead to legal claims by employees exposed to secondhand smoke.<sup>41</sup>

Our cost estimate is built around several assumptions about average costs. Average costs are just that—averages. For any given particular employer, costs may be higher or lower due to the makeup of employees or a variety of costs that vary by industry. Our calculations can, however, be easily modified where employers are aware of their costs. For example, employers could better estimate their own costs by using their company's average per-hour wage in place of the national average.

It should also be noted that for some variables (such as absenteeism and healthcare costs), former smokers still impose higher costs than never smokers. (Indeed, some evidence suggests that the number of absences increases in the short term when an employee quits smoking, though the level of absences drops in the long run.<sup>6</sup>) In addition, effective smoking cessation programmes are not free. Thus, eliminating all costs described in this paper may not be an obtainable goal. Nonetheless, employers can significantly reduce long-term costs by implementing smoking cessation programmes.<sup>42</sup> Employers with the largest numbers of smoking employees have the most potential to benefit from helping employees to quit smoking, and Halpern *et al*<sup>43</sup> estimate that the benefits of a worksite cessation programme are likely to outweigh the costs to employers in approximately 4 years.

As suggested above, employers may also consider reducing smoking-related excess costs by hiring only non-smokers or increasing healthcare premiums for non-smokers. The ethical and legal implications of such policies have been extensively discussed elsewhere,<sup>44–49</sup> including by two authors of this paper.<sup>50</sup> The purpose of this paper is to provide needed factual context to discussions about worksite tobacco policies, not to add to the debate on the normative value of such policies. What seems clear, however, is that this evidence does not simply relate to a dispute about whether an employer has a moral or legal right to regulate behaviour that occurs away from the workplace. These substantial costs detailed in this paper suggest that the employee brings his or her addiction to work even if the act of smoking occurs elsewhere. This is not unexpected, as smoked nicotine is a powerful modulator of important neurotransmitters and its effects persist well beyond the time spent with a cigarette. Just as employers may reasonably address the behavioural side effects of alcohol abuse or legal use of prescribed narcotics, they may have a valid interest in the workplace effects of legal tobacco use that occurs off-premises. Of course other countervailing concerns, such as the potential of 'smoker-free workforce' policies to further exacerbate existing health disparities, must also be considered.<sup>44–48</sup> In addition, it should be noted that employer policies to hire only non-smokers are not legal in all states.<sup>50</sup>

Finally, we need to point out two obvious, yet often overlooked facts. First, it is important to remember that the costs imposed by tobacco use are not simply financial costs. It is not possible to put a price on the lost lives and the human suffering caused by smoking. The desire to help one's employees lead

#### Box 5 Death benefit

- ▶ Subsidy= $((\text{Subsidy Male} \times \text{Percent Male}) + (\text{Subsidy Female} \times \text{Percent Female})) \times \text{Inflation} / \text{Years Worked} = \$295.50$ .
- ▶ Subsidy: Benefit offered by smoker to a private defined-benefit plan offering employer.
- ▶ Subsidy Male: Subsidy of male a smoker (\$10 123).
- ▶ Percent Male: percent of male workers in the private industry (53.4%).
- ▶ Subsidy Female: Subsidy of female smoker (\$383).
- ▶ Percent Female: Percent of female workers in the private industry (46.6%).
- ▶ Inflation adjustment: Adjustment for inflation from 2000.
- ▶ Years Worked: Average number of years the smoker contributes the subsidy (24).

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healthier and longer lives should provide an additional impetus for employers to work towards eliminating tobacco from the workplace. Second, many current smokers are addicted in large part because of the tobacco industry's aggressive advertising of a deadly product and because of the industry's decades-long campaign to hide and distort the truth about the dangers of smoking. The need for private action to eliminate smoking from the workplace should not detract from efforts to implement public policy changes (such as smoke-free workplace laws, higher cigarette taxes, and increased funding for counter-marketing programmes) that will counteract the industry's advertising and reduce smoking prevalence in the next generation.

## What this paper adds

- ▶ Numerous studies have demonstrated that employees who smoke tobacco have higher levels of absenteeism, presenteeism and healthcare costs, in comparison to employees who do not smoke.
- ▶ No previous US studies have aggregated these costs to quantify the excess costs that employees who smoke tobacco impose on their employers.
- ▶ By analysing previous studies, we estimate that US businesses incur excess costs in the range of \$5816 per year for each employee who smokes.
- ▶ Such information may help inform employer decisions about tobacco-related policies.

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## REFERENCES

- 1 Adhikari B, Kahende J, Malarcher A, *et al*. Annual smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 2000–2004. *MMWR Morb Mortal Wkly Rep* 2008;57:1226–8.
- 2 Valleur C. If you're smoking you're fired: how tobacco could be dangerous to more than just your health. *DePaul J Health Care Law* 2007;10:457–92.
- 3 Berman M. Hiring only nonsmokers is legal and beneficial. *Columbus Dispatch* 2007 July 12: 9A.
- 4 Afzal S. Smokers need not apply; is hiring ban trend of the future? *Christ Sci Monitor* [newspaper on the Internet] 2010: Nov. 21. <http://www.csmonitor.com>
- 5 Robinson J. Light up, lose your job. *Los Angeles Times* 2006 Feb. 19: M3.
- 6 Javitz HS, Zbikowski SM, Swan GE, *et al*. Financial burden of tobacco use: an employer's perspective. *Clin Occup Environ Med* 2006;5:9–29.
- 7 Hallamore C. *Smoking and the bottom line: updating the costs of smoking in the workplace*. Ottawa, Canada: Conference Board of Canada 2006. <http://www.conferenceboard.ca>
- 8 Musich S, Napier D, Edington DW. The association of health risks with workers' compensation costs. *J Occup Environ Med* 2001;43:534–41.
- 9 Boyce RW, Perko MA, Jones GR, *et al*. Physical fitness, absenteeism and workers' compensation in smoking and non-smoking police officers. *J Occup Environ Med* 2006;56:353–6.
- 10 Cowan B, Schwab B. The incidence of the healthcare costs of smoking. *J Health Econ* 2011;30:1094–102.
- 11 Robbins AS, Fonseca VP, Chao SY, *et al*. Short term effects of cigarette smoking on hospitalization and associated lost workdays. *Tob Control* 2000;9:389–96.
- 12 Max W, Rice DP, Sung HY, *et al*. The economic burden of smoking in California. *Tob Control* 2004;13:264–7.
- 13 Tsai SP, Wen CP, *et al*. Workplace smoking related absenteeism and productivity costs in Taiwan. *Tob Control* 2005;14:i33–7.
- 14 Lundborg P. Does smoking increase sick leave? Evidence using register data on Swedish workers. *Tob Control* 2007;16:114–18.
- 15 United States Department of Labor, Bureau of Labor Statistics. American Time Use Survey Summary [Internet]. 2011 [updated June 22]. <http://www.bls.gov/news.release/atus.nr0.htm>
- 16 Employee Benefit Research Institute. EBRI Databook on Employee Benefits [Internet]. 2011: Table 3.1c [updated June 2011]. <http://www.ebri.org/pdf/publications/books/databook/DB.Chapter%2003.pdf>
- 17 Bertera L. The effects of behavioural risks on absenteeism and health-care costs in the workplace. *J Occup Med* 1991;33:1119–24.
- 18 Tsai SP, Wendt JK, Cardarelli MK, *et al*. A mortality and morbidity study of petroleum workers in Louisiana. *Occup Environ Med* 2003;60:627–33.
- 19 Weng SF, Ali S, Leonardi-Bee J. Smoking and absence from work: systematic review and meta-analysis of occupational studies. *Addiction* 2013;108:307–19.
- 20 Benowitz NL. Pharmacology of nicotine: addiction and therapeutics. *Annu Rev Pharmacol Toxicol* 1996;36:597–613.
- 21 Matkic S, Balakrishnan A, Bergamo G, *et al*. A review of methods to measure health-related productivity loss. *Am J Manag Care* 2007;13:211–17.
- 22 Halpern MT, Shiklar R, Rentz AM, *et al*. Impact of smoking status on workplace absenteeism and productivity. *Tob Control* 2001;10:233–8.
- 23 Bunn WB 3rd, Stave GM, Downs KE, *et al*. Effect of smoking status on productivity loss. *J Occup Environ Med* 2006;48:1099–108.
- 24 Burton WN, Chen CY, Conti DJ, *et al*. The association of health risks with on-the-job productivity. *J Occup Environ Med* 2005;47:769–77.
- 25 Shiklar R, Halpern MT, Rentz AM, *et al*. Development of the health and work questionnaire (HWQ): an instrument for assessing workplace productivity in relation to worker health. *Work* 2004;22:219–29.
- 26 Borland R, Cappiello M, Owen N. Leaving work to smoke. *Addiction* 1997;92:1361–8.
- 27 U.S. Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 2004. *MMWR Morb Mortal Wkly Rep* 2005;54:1121–4.
- 28 Warner KE, Hodgson TA, Carroll CE. Medical costs of smoking in the United States: estimates, their validity, and their implications. *Tob Control* 1999;8:290–300.
- 29 Williams AF, Franklin J. Annual economic costs attributable to cigarette smoking in Texas. *Tex Med* 1993;89:56–60.
- 30 Chudy N, Remington PL, Yoast R. The increasing health and economic burden from cigarette smoking in Wisconsin. *Wis Med J* 1992;91:633–6.
- 31 U.S. Centers for Medicare and Medicaid Services. National health expenditures from Centers for Medicare and Medicaid [Internet]. 2012 [updated Apr 11]: Table 6. <http://www.cms.hhs.gov/NationalHealthExpendData/downloads/tables.pdf>
- 32 U.S. Department of Labor, Bureau of Labor Statistics. Top picks: employment, hours, and earnings [Internet]. 2010 [last visited Jan 31, 2012]. <http://data.bls.gov/cgi-bin/surveymost?ce>
- 33 King B, Dube S, Kaufmann R, *et al*. Current cigarette smoking among adults aged ≥18 years—United States, 2005–2010. *MMWR Morb Mortal Wkly Rep* 2011;60:1207–12.
- 34 Barendregt JJ, Bonneux L, van der Maas PJ. The health care costs of smoking. *N Engl J Med* 1997;337:1052–7.
- 35 Rasmussen SR, Prescott E, Sørensen TI, *et al*. The total lifetime costs of smoking. *Eur J Public Health* 2004;14:95–100.
- 36 Rasmussen SR, Prescott E, Sørensen TI, *et al*. The total lifetime health cost savings of smoking cessation to society. *Eur J Public Health* 2005;15:601–6.
- 37 Wyatt E. Pension change puts the burden on the worker. *NY Times* 2002 Apr 5: A1.
- 38 Sloan FA, Ostermann J, Conover C, *et al*. *The price of smoking*. Cambridge, MA: MIT Press, 2005: 178.
- 39 U.S. Department of Labor, Bureau of Labor Statistics. Employment status of the civilian population by sex and age [Internet]. <http://www.bls.gov/news.release/empst.t01.htm>
- 40 Costo SL. Trends in retirement plan coverage over the last decade. *Mon Labor Rev* 2006;129:58–64.
- 41 Zellers L, Thomas MA, Ashe M. Legal risks to employers who allow smoking in the workplace. *Am J Public Health* 2007;97:1376–82.
- 42 Levy DE. Employer-sponsored insurance coverage of smoking cessation treatments. *Am J Manag Care* 2006;12:553–62.
- 43 Halpern MT, Dirana R, Schmier JK. Impacts of a smoking cessation benefit among employed populations. *J Occup Environ Med* 2007;49:11–21.
- 44 Voigt K. 'Nonsmoker and nonnicotine hiring policies: the implications of employment restrictions for tobacco control'. *Am J Public Health* 2012;102:2013–18.
- 45 Houle B, Siegel M. Smoker-free workplace policies: developing a model of public health consequences of workplace policies barring employment to smokers. *Tob Control* 2009;18:64–9.
- 46 Gray NJ. The case for smoker-free workplaces. *Tob Control* 2005;14:143–4.
- 47 Champan S. The smoker-free workplace: the case against. *Tob Control* 2005;14:144.
- 48 Schmidt S, Voigt K, Emanuel EJ. The ethics of not hiring smokers. *N Engl J Med* 2013;368:1369–71.
- 49 Asch DA, Muller RW, Volpp KG. Conflicts and compromises in not hiring smokers. *N Engl J Med* 2013;368:1371–73.
- 50 Berman M, Crane R. Mandating a tobacco-free workforce: a confluence of business and public health interests. *William Mitchell Law Rev* 2008;34:1651–74.



## Estimating the cost of a smoking employee

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