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Tobacco product use among workers in the construction industry, United States, 2014-2016

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Abstract

Background: Although cigarette smoking has declined among U.S. workers, smoking remains high among construction workers. This study assessed tobacco product use among U.S. construction workers.

Methods: The 2014–2016 National Health Interview Survey data for U.S. working adults were analyzed.

Results: Of the 10.2 (6.3% of working adults) million construction workers, 35.1% used any tobacco product; 24.4% were cigarette smokers, 8.3% were cigar, cigarillo, pipe or hookah smokers, 7.8% were smokeless tobacco users, 4.4% were e-cigarette users, and 7.6% used ≥2 tobacco product users. Tobacco use varied by worker characteristics, with highest tobacco use (>35%) among those reporting ≤5 years on the job, temporary work status, job insecurity, or an unsafe workplace. Construction workers had higher odds of tobacco product use than non-construction workers.

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AUTHORS' CONTRIBUTIONS

Concept and design: GS, BK, and JM. Acquisition, and interpretation of data: GS, BK, and JM. Statistical analysis: GS. Drafting of the manuscript and critical revision of the manuscript for important intellectual content GS, BK, and JM. Administrative, technical, or material support: KD and JM. All authors have read and approved the final version of the manuscript.

ETHICS APPROVAL AND INFORMED CONSENT

Publicly available data without personal identifiers data were used in this study.

DISCLOSURE (AUTHORS)

The authors declare no conflicts of interest.

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DISCLAIMER

The findings and conclusions in this report are those of authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

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Conclusions: Over one-third of U.S. construction workers use tobacco products and disparities exist across sub-groups. Workplace tobacco control strategies could reduce tobacco use among this population.

Keywords

construction workers; health status; industry; occupation; tobacco use

1 | INTRODUCTION

Tobacco use is the leading cause of preventable death and disease in the United States. More than 16 million persons live with a smoking-related disease and an estimated 480 000 deaths per year are caused by cigarette smoking.[1] Smoking harms nearly every organ of the body, and has been shown to cause cancer, coronary heart disease, lung diseases, stroke, diabetes, chronic obstructive pulmonary disease (COPD), and other adverse health outcomes.[1]

Over the past half century, evidence-based tobacco prevention and control interventions have averted an estimated eight million premature deaths.[2] The workplace is an important setting for the implementation of such evidence-based strategies,[3–6] including anti-tobacco messages, comprehensive tobacco-free laws covering public places and worksites, and comprehensive coverage for tobacco cessation treatments for employees.[1] Smoke-free workplace policies have been particularly beneficial in reducing smoking rates. Research has shown that workers at worksites that implemented smoke-free policies were twice as likely to quit smoking as those whose worksites did not implement such policies.[6] Moreover, smoke-free workplace policies can reduce secondhand smoke exposure among nonsmokers, thus improving the overall health of all workers.[4–7] In addition to smoke-free policies, integrating comprehensive and effective tobacco cessation programs into workplace health promotion programs can further help reduce tobacco use rates among workers.[8]

Among U.S. working adults, cigarette smoking declined from 22.4% in 2004 to 18.1% in 2012.[9–11] However, increases have occurred in the use of non-cigarette tobacco products in recent years, and the use of multiple tobacco products has become common among current users of non-cigarette tobacco products.[9–12] Disparities in tobacco product use also exist by product type, sociodemographic characteristics, and industry and occupation groups.[10] During 2014–2016, among working U.S. adults, 22.1% (32.7 million) currently used tobacco products, with construction industry workers having the highest prevalence of tobacco product (34.3%) use.[10] In addition, construction workers are also exposed to various workplace hazards such as dusts, chemicals, fumes (eg, asphalt, welding), and others, which can increase smoking-related health risks.[13–15] For example, cigarette smokers have an elevated risk for lung cancer (rate ratio = 10.3, 95% CI, 8.8–12.2); and the risk for lung cancer increases by 40% (rate ratio = 14.4, 95% CI, 10.7– 19.4)[13] among smokers who are exposed to asbestos.[13]

The construction industry is one of the fastest growing U.S. occupational sectors, with a 2.8% projected annual increase in growth and employment (790 000 new jobs) by 2024.[16] Recent findings indicate that workers in the construction industry are more likely to have poorer health and less likely to have access to healthcare-related services.[17] An estimated

30% of construction workers have no health insurance, while 12.2% report having poor physical health, 4.7% report having poor mental health, and 60% report having at least one doctor-diagnosed health outcome.[17] In addition, 25.2% of construction workers continue to smoke cigarettes, and construction workers have almost twice the odds (POR = 1.94) of using any tobacco (combustible or smokeless) as compared with all other workers.[12] Therefore, understanding health risk behaviors among construction workers, including tobacco use, could help inform efforts to improve the health and overall wellness of this population.

To date, studies on tobacco product use behaviors among U.S. construction workers have been limited to overall estimates of use[10,11] and, to our knowledge, no study has examined tobacco use patterns among construction workers. To address this gap, this study analyzed 2014–2016 National Health Interview Survey (NHIS) data to assess patterns of tobacco product use among U.S. workers employed in the construction industry sector by select socioeconomic factors, self-reported health, worker, and workplace characteristics.

2 | METHODS

2.1 | Data source

The NHIS, which has been conducted annually since 1957 by the National Center for Health Statistics (NCHS), collects information on health status, health conditions, health care services, health behavior, and employment status from the U.S. civilian non-institutionalized population.[18] One adult aged ≥18 years per family is randomly selected to participate in the Sample Adult component of the survey. All adult NHIS respondents provided oral consent prior to participation. For the current study, combined data from the 2014–2016 NHIS were analyzed. The total number of NHIS adult respondents was 36 697 in 2014, 33 672 in 2015, and 33 028 in 2016. The survey response rate was 60.8% in 2014, 55.2% in 2015, and 54.3% in 2016.

2.2 | Employment status

The analysis was restricted to adults (n = 65 047), who responded “yes” to “working at a job or business,” “with a job or business but not at work,” or “working, but not for pay, at a family-owned job or business” any time in the 12 months prior to the interview. Adults with missing/ unknown information on employment (n = 1021) were excluded from the analysis. Major industry code “04” was used to identify workers in the construction industry. Construction industry occupations were grouped into seven categories based on the type of occupation and sample sizes: management; office, and administrative support; supervisors, construction, and extraction trade; installation, maintenance, and repair; production, transportation, warehousing, and repair; and all other construction workers.

2.3 | Tobacco product use

Current cigarette smokers were defined as those who smoked at least 100 cigarettes in their lifetime and who currently smoked “every day” or “some days” at the time of interview. Other current combustible tobacco smokers were those who, at the time of the survey, reported smoking tobacco products other than cigarettes (ie, cigars, pipes, water pipes or

hookahs, cigarillos, bidis) “every day,” or “some days.” Smokeless tobacco users were those who, at the time of the survey, reported using smokeless tobacco products (ie, chewing tobacco, snuff, dip, snus, or dissolvable tobacco) “every day,” or “some days.” E-cigarette (ie, vape-pens, hookah-pens, e-hookahs, or e-vaporizers) users were those who, at the time of the survey, reported using e-cigarettes “every day,” or “some days.”

Any tobacco product users were defined as those who reported current (“everyday” or “someday”) use of one or more of the assessed tobacco products (cigarettes, other combustible tobacco products, e-cigarettes, or smokeless tobacco). Multiple tobacco product users were those who reported concurrent use of two or more of the assessed tobacco products.

2.4 | Health characteristics

Self-reported health status was assessed using responses to the question, “In general, how would you say your health was in the past 12 months prior to the interview?” (response options were “poor,” “fair,” “good,” “very good,” and “excellent”). Responses were grouped into two categories: very good health (ie, “excellent” or “very good” or “good”) and poor health (ie, “fair” or “poor”). Current emotional health was assessed using responses to the questions about the extent to which different feelings interfered in the past 30 days with their life or activities:, if answered “a lot,” “some,” “a little” where then asked, “During the past 30 days did you feel … sad, nervous, restless or fidgety, hopeless, that everything was an effort or worthless a lot/ some/a little of the time and not at all?” Responses were grouped into two categories: “good mental health,” if they responded “Not at all,” and “poor mental health,” if responded “a lot/ some/a little of the time.”

Respondents with chronic obstructive pulmonary disease (COPD) were defined as those who were ever told by a doctor or other health professional that they had either emphysema or chronic bronchitis in the past 12 months. Respondents with current asthma were those who were ever told by a doctor or other health professional that they had asthma and still have asthma. Respondents were considered to have heart disease if they were told by a doctor or other health professional that they had any kind of heart condition or heart disease; to have hypertension if they were ever told by a doctor or other health professional that they had hypertension and were told that they had hypertension during two or more visits; to have cancer if they were ever told by a doctor or other health professional that they had some form of cancer. Respondents were considered to have multiple chronic conditions if they responded to two or more of any of the assessed self-reported health conditions. In addition, missed work days at a job or business because of illness or injury (not including maternity leave) during the 12 months prior to the interview was examined.

2.5 | Workplace characteristics

Information on workplace characteristics was available only for 2015. Secondhand smoke exposure was assessed based on a “yes” response to the question, “In the past 12 months, while at work, how often were you exposed to tobacco smoke from other people?” Additional worker related factors were work-family imbalance, job insecurity, job demand, workplace safety, supervisor support, the importance of safety and health to management,

and the availability of health promotion programs. Respondents were considered to have work-family imbalance if they answered “agree” or “strongly agree” to the statement, “Job interferes with personal or family life.” If the respondent answered “yes” to “worried about losing job,” then they were considered to have job insecurity. Job demand was considered high if the respondent “strongly disagreed” or “disagreed” to “having enough time to get the job done.” Respondents were considered to have an unsafe workplace if they answered “very unsafe” or “unsafe” to “how safe do you think your workplace is?” Supervisor support was based on a response of “yes” to the question, “can you count on your supervisor or manager for support when you need it?” The importance of health and safety to management was based on a response of “yes” to the question, “health and safety of workers is a high priority with management at work.” The availability of health promotion programs was defined as a response of “yes” to the question, “health promotion programs made available to you by your employer?”

2.6 | Statistical analysis

SAS® 9.4 (SAS Institute Inc., Cary, NC) was used for analyses. Sample weights provided by NCHS were used to take into account the complex sampling design and item non-response. The analyses were conducted in 2017.

Differences between groups were assessed using the *t*-test.[19] Bivariate logistic regression was used to calculate prevalence odds ratios (PORs) and multivariate logistic regression was used to calculate adjusted PORs. All multivariate models were simultaneously adjusted for age (continuous), sex, and race/ethnicity, education, income, and region because of their significant association with tobacco product use. Estimates with a relative standard error greater than 30% were considered unreliable and were not reported. Difference were considered statistically significant at $P < 0.05$.

3 | RESULTS

During 2014–2016, of the estimated 161 million working U.S. adults, 10.2 million (6.3%) were working in the construction industry. Among construction industry workers, 35.1% currently used some form of tobacco product, 24.4% were cigarette smokers, 8.3% were other combustible tobacco smokers, 7.8% were smokeless tobacco users, 4.4% were e-cigarette users, and 7.6% used ≥2 tobacco products (Table 1). Any tobacco product use was highest among males (35.4%), those with ≤high school diploma or GED (36.5%), those who did not have health insurance (39.1%), and those living in the Midwest region (40.3%). Tobacco product use was significantly higher among construction workers than all other working adults (35.1% vs 21.8%; adjusted POR, 1.4) (Table 1).

Among current smokers (Table 1), 13.7% were other combustible tobacco smokers, 9.2% were smokeless tobacco users, and 12.5% were e-cigarette users. Among former cigarette smokers, 22.6% used some form of tobacco other than cigarettes and 11.9% used smokeless tobacco. Multiple (≥2) tobacco product use was highest among workers aged 18–34 years (11.0%), those with ≤High School or GED (7.8%), those with income <$35 000 (9.1%), those with no health insurance (8.8%), and those living in the South (8.8%) (Table 1).

3.1 | Tobacco product use by health status

When tobacco products users were compared with non-users, health status varied by type of tobacco product used. Compared with non-tobacco users, any tobacco product users had higher odds of having poorer physical health (POR = 1.9), COPD (POR = 3.2), current asthma (POR = 1.6), ever having had cancer (POR = 1.6), multiple chronic conditions (POR = 2.0), and work days lost due to illness (POR = 1.6). Compared with non-combustible tobacco users, combustible tobacco smokers had significantly higher odds of having poor physical health (POR = 2.1), COPD (POR = 3.3), cancer (POR = 1.8), multiple chronic conditions (POR = 2.1), and number of work days lost (≥1 days) due to illness (POR = 1.4). Compared with non-smokeless tobacco users, smokeless tobacco users had significantly higher odds of having hypertension (POR = 1.9) and higher work days lost due to illness (POR = 1.6) (Table 2).

3.2 | Worker characteristics and tobacco product use

The proportion of workers reporting job related stress factors were comparable, irrespective of whether they were construction or non-construction workers. An estimated 24.2% of construction workers reported work-life imbalance, 11.9% reported job insecurity, 7.4% considered their workplace unsafe, 6.0% disagreed that health and safety are high priorities to management, and 76.1% reported no health promotion activities in the workplace (Table 3). Among workers who reported health promotion activities 29.2% (20.9–37.3) were former smokers and 19.0% (95%CI, 14.8–23.2) were current smokers.

Tobacco product use was highest among temporary workers (38.3%), among workers in establishments with <50 employees (34.4%), and among those who reported family/work-life imbalance (33.9%), job insecurity (37.7%), unsafe workplace (39.9%), high work demand (35.0%), and no support from supervisors (42.7%) (Table 3).

Prevalence of tobacco product use varied by occupation (Table 4). Cigarette smoking prevalence was highest among workers in the construction trade (27.2%) occupations. Other combustible tobacco product use prevalence was highest among workers in management (12.0%) occupations, smokeless tobacco use was highest among workers in supervisors, construction & extraction (13.8%) occupations, and e-cigarette use (8.3%) and multiple tobacco product use (9.9%) was highest among workers in the installation, maintenance, and repair occupations (Table 4).

The proportion of workers in the construction industry exposed to secondhand smoke by tobacco product use and by occupation is shown in Table 5. Overall, an estimated 49.4% of construction workers reported secondhand smoke exposure compared with 21.9% of non-construction workers (POR = 2.9; 95%CI: 2.4–3.7; data not shown). An estimated 40.6% of non-tobacco product users reported exposure to secondhand smoke. An estimated 70% of combustible tobacco product smokers and 55.6% of non-combustible tobacco product users reported secondhand smoke exposure (Table 5). By occupation, non-tobacco users reporting secondhand smoke exposure ranged from 29.1% among management workers to 53.6% among workers in supervisors, construction, and extraction occupations (Table 5).

4 | DISCUSSION

During 2014–2016, among the 10.2 million U.S. adults working in the construction industry, approximately one-third currently used some form of tobacco product and 7.6% used multiple tobacco products. Although a decline in overall cigarette smoking was observed among construction workers from 35.7% in 2004 to 28.1% in 2011,[11] current findings show that approximately one in four construction workers continue to be current cigarette smokers. In addition, an estimated 8.3% use other forms of combustible tobacco products such as cigars, cigarillos, pipes, and hookahs. These findings are of public health concern given the increased burden of death and disease caused from tobacco use in the United States.[1]

Consistent with previous research, tobacco product use varied by sociodemographic characteristics among construction workers. Specifically, tobacco product use was higher among males, those with less than a high school diploma, and those who did not have health insurance.[9,17] Consistent with previous research, younger workers (<34 years of age) and workers with less than 5 years on the job had a higher prevalence of tobacco product use compared with those working for more than 5 years on the job.[8,9,17] These disparities could be explained, in part, by lack of knowledge of tobacco smoking hazards, differences in workplace tobacco control policy coverage, and limited access to evidence-based smoking cessation resources.[1] The disparities noted in this report suggest that enhancing coverage of workplace tobacco control interventions to ensure that they reach all workers, particularly those with the greatest burden of use, could be beneficial in improving worker health.

Occupational differences in type of tobacco product used were observed among workers in the construction industry. For example, construction trade workers had the highest cigarette smoking prevalence, and installation, maintenance, and repair workers had the highest prevalence of e-cigarette and multiple tobacco product use. Previous findings indicate that construction trade workers are also less likely to be covered by a smoke free workplace policy compared with all other occupations.[20] These findings may be because work characteristics and worksites may vary among construction industry workers, such as working outdoors, having scattered worksites, and changing-employers, which could make it less feasible for traditional employer based cessation programs.[3] Furthermore, occupational factors (job stress, unsatisfactory working conditions, job demand) and workplace exposures (dust, chemicals) have been found to be associated with tobacco product use among construction trade workers.[4,21,22] Exposure to tobacco smoke and occupational hazards may also have an synergistic effect on workers' health.

The current findings also reveal that nearly 1 in 10 construction workers use multiple forms of tobacco products. The complexity of tobacco use behaviors among construction workers, including multiple tobacco product use, is especially important to consider when developing and implementing workplace cessation programs.[6,23] Multiple tobacco product use may increase nicotine exposure, dependence, and risk of tobacco-attributable disease and death.[6,21]

Among all construction workers, approximately two in five non-tobacco products users were exposed to secondhand smoke. This rate of exposure was markedly higher than previous studies of all U.S. workers, which have found that 10–20% of all non-cigarette smokers were exposed to secondhand smoke.[24–26] The U.S. Surgeon General has concluded that there is no risk-free level of secondhand smoke exposure, and secondhand smoke exposure has been shown to cause lung cancer, coronary heart disease, stroke, and can exacerbate existing asthma and COPD.[25,26] Smoke-free workplace policies have been shown to reduce workplace exposure to secondhand smoke, as well as to promote cessation among workers.[24–28]

Workplace social and cultural factors, as well as job stress, are important risk factors for smoking.[3,29] The current study findings show that greater than one-third of the construction workers who reported family/work-life imbalance, job insecurity, unsafe workplace, high work demand, and having no support from a supervisor, used some form of tobacco product. The exact cause of higher tobacco use prevalence among construction workers is unknown; however, it may be partly explained by multiple job stressors rather than just a single factor. Working under stressful working conditions (eg, musculosketal hazards, secondhand smoke exposure, no job satisfaction), and hazardous exposures to dust and chemicals have been associated with higher smoking prevalence among building trade workers, craftsmen, and laborers.[30,31] Compared to non-smoking workers, those who smoked more routinely reported that smoking relieved stress.[30,31] Given that work and worker characteristics within occupations are important determinants for health disparities, organizational, cultural, and work characteristics are important to take into account when implementing workplace tobacco control interventions and cessation services.[3] Future studies that assess the relationship between construction work, worker characteristics, and tobacco product use could be beneficial.

Tobacco product users were found to have significantly higher odds of having poorer physical health, COPD, cancer, multiple chronic conditions, and work days lost due to illness as compared with non-users. Findings from previous studies suggest that construction workers are at increased risk for COPD and pneumoconiosis due to various occupational hazards such as organic dusts, wood dusts, silica, and isocyanates.[14,32–34] Furthermore, in a study among laborers and craftsperson, those who were exposed to chemical hazards were more likely to be cigarette smokers compared with those who were unexposed (odds ratio = 1.42).[31] Exposure to both tobacco smoke and occupational exposures can have a synergistic respiratory health effect.[13–15,33] The proportion of construction workers reporting health promotion activities was lower among construction workers compared with non-construction workers. Similar to previous research, health promotion activities were lower among those working is smaller establishments; however, employees of smaller employers reported greater odds of using available resources compared to employees of larger employers.[35] Integrating health promotion with health protection could help reduce cigarette smoking, increasing quit ratios, and reduce disease risks among workers.[31]

The findings in this report are subject to some limitations. First, information on the type of tobacco product used was self-reported and may be subject to reporting bias; however, previous studies have indicated that self-reported estimates of cigarettes and smokeless

tobacco are valid.[36,37] Second, self-reported secondhand smoke exposure was used, which could have resulted in misclassification of exposure. However, self-reported secondhand smoke exposure has been previously validated and was significantly correlated with measured cotinine levels.[38] Third, this was a cross-sectional analysis, which does not allow for the assessment of causal inferences between smoking and health outcomes or the long-term health effects of tobacco use. Finally, small sample sizes in certain occupation groups resulted in unreliable estimates.

5 | CONCLUSIONS

Over one-third of U.S. construction workers use some form of tobacco product, and use varies by worker and workplace characteristics. These results underscore the importance of workplace tobacco prevention and control strategies that address all types of tobacco products used by U.S. workers, particularly among workers with the highest prevalence of use such as construction workers. Tailoring interventions and cessation programs specifically to the workplace and the needs of workers can help address overall safety, health and well-being of workers.[2,3,31,39] To maximize the health of workers, and reduce tobacco use and secondhand smoke exposure, employers can designate workplaces as tobacco-free, provide employees with information about the risks of tobacco product use, and integrate comprehensive and effective tobacco cessation programs into workplace health promotion.[2,4,6–8,39]

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TABLE 1

Characteristics of construction industry workers and prevalence of tobacco use, by type of product, 2014–2016

Selected characteristics	Estimated construction workers[a]	Cigarette[b] smokers		Cigars, cigarillos, pipes, hookahs[c] users		Smokeless[d] tobacco users		E−cigarette[e] users		Multiple[f] tobacco		Any tobacco users[h]			
	In 1000 s	*P*	95%CI	*P*	95%CI	*P*	95%CI	*P*	95%CI	*P*	95%CI	*P*	95%CI	POR[g]	95%CI
Total (100%)	10 217	24.4	22.5–26.3	8.3	7.1–9.5	7.8	6.6–9.0	4.4	3.5–5.3	7.6	6.5–8.8	35.1	33.0–37.1	1.4[i]	1.2–1.5
Age group (years)															
18–34	3232	26.7	23.1–30.3	11.2	8.5–13.9	9.9	7.8–12.0	6.1	4.2–8.0	11.0	8.5–13.6	37.7	33.9–41.5	1.3[i]	1.1–1.6
35–54	4879	25.1	22.5–27.8	6.7	5.2–8.2	8.4	6.7–10.1	3.6	2.6–4.7	6.8	5.2–8.4	34.4	31.6–37.2	1.4[i]	1.2–1.6
≥55	2106	19.3	15.6–23.0	7.5	5.1–9.9	3.4	1.5–5.4	3.1	1.4–4.8	4.3	2.5–6.1	27.8	23.5–32.0	1.5[i]	1.2–1.8
Gender															
Male	9314	24.9	22.8–26.9	8.9	7.6–10.3	8.5	7.2–9.9	4.5	3.6–5.4	8.1	6.8–9.4	35.4	33.2–37.5	1.4[i]	1.3–1.6
Female	902	20.0	14.5–25.6	[j]	-	-	-	-	-	-	-	21.2	15.5–26.8	1.4[i]	1.0–2.0
Race/ethnicity															
Hispanic	2925	18.3	14.9–21.8	3.3	1.9–4.7					3.1	1.4–4.9	20.6	17.0–24.1	1.1	0.9–1.4
White, non-Hispanic	6466	26.7	24.2–29.1	10.5	8.8–12.3	11.7	9.8–13.5	5.4	4.3–6.5	9.9	8.3–11.5	40.1	37.5–42.7	1.5[i]	1.4–1.7
Black, non-Hispanic	539	29.5	20.9–38.0	-	-	-	-	-	-	-	-	35.4	26.9–43.9	1.4	1.0–2.2
Other	287	27.2	16.7–37.6	-	-	-	-	-	-	-	-	34.4	23.6–45.2	1.9[i]	1.1–3.2
Education															
≤High school, GED	5744	28.5	25.9–31.1	6.4	4.8–7.9	8.1	6.6–9.7	4.4	3.2–5.5	7.8	6.1–9.4	36.5	33.8–39.2	1.2[i]	1.1–1.4
>High school	4393	19.2	16.6–21.9	10.8	8.8–12.7	7.6	5.9–9.2	4.3	2.9–5.7	7.6	5.8–9.4	31.2	28.2–34.1	1.7[i]	1.5–2.0
Unknown	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Family income															
<$35 000	2505	34.0	30.1–37.9	7.4	5.0–9.7	4.6	3.0–6.3	5.8	3.6–7.9	9.1	6.4–11.8	38.8	34.8–42.7	1.3[i]	1.1–1.5
$35 000-$74 999	3277	25.3	22.3–28.4	8.4	6.4–10.5	8.9	6.6–10.7	4.3	2.9–5.7	8.3	6.3–10.2	35.3	31.9–38.7	1.3[i]	1.1–1.6
≥$75 000	3580	17.2	14.2–20.3	8.8	6.7–11.0	10.3	7.8–12.9	3.6	2.2–5.1	6.4	4.5–8.2	31.0	27.4–34.5	1.5[i]	1.2–1.8
Unknown	855	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Health insurance status															
Not insured	2881	33.7	29.9–37.5	6.8	4.7–8.9	6.1	4.1–8.0	5.8	3.7–7.9	8.8	6.3–11.3	39.1	35.2–43.0	1.2[i]	1.0–1.5

Selected characteristics	Estimated construction workers[a]	Cigarette[b] smokers		Cigars, cigarillos, pipes, hookahs[c] users		Smokeless[d] tobacco users		E−cigarette[e] users		Multiple[f] tobacco		Any tobacco users[h]			
	In 1000 s	*P*	95%CI	*P*	95%CI	*P*	95%CI	*P*	95%CI	*P*	95%CI	*P*	95%CI	POR[g]	95%CI
Insured	7273	20.7	18.6–22.8	8.9	7.4–10.4	8.6	7.1–10.1	3.7	2.8–4.6	7.2	5.9–8.5	32.1	29.9–34.3	1.4[i]	1.2–1.6
Unknown	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U.S. census region[k]															
Northeast	1698	20.0	15.7–24.2	8.2	5.4–11.0	4.1	2.1–6.2	2.9	1.3–4.5	4.8	2.8–6.8	27.8	22.9–32.7	1.0	0.8–1.3
Midwest	2217	27.7	23.3–32.2	9.0	6.2–11.8	11.2	8.3–14.0	4.7	2.9–6.5	8.7	6.4–11.1	40.3	36.1–44.5	1.5[i]	1.2–1.9
South	3875	28.6	25.3–31.9	7.7	5.7–9.6	8.1	5.8–10.3	5.4	3.6–7.2	8.8	6.6–11.1	37.4	34.1–40.7	1.5[i]	1.3–1.8
West	2427	17.9	14.8–20.9	8.7	6.1–11.3	6.9	7.7–9.2	3.6	2.0–5.2	6.7	4.4–9.0	27.5	23.8–31.3	1.3[i]	1.0–1.5
Cigarette smoking status[l]															
Current	2487	24.4	22.5–26.3	13.7	10.4–17.0	9.2	6.8–11.7	12.5	9.4–15.5	5.9	3.8–8.0	28.5	24.4–32.6	0.9	0.7–1.1
Former	2406	23.6	21.9–25.4	8.9	6.4–11.5	11.9	8.9–14.8	4.6	3.0–6.1	2.2	1.1–3.4	22.6	19.0–26.1	1.2	1.0–1.6
Never	5286	51.9	49.8–54.0	5.5	4.1–6.8	5.3	3.9–6.6	-	-	-	-	10.6	8.8–12.4	1.2	1.0–1.5

CI, confidence interval; GED, General Educational Development certificate or diploma; P, prevalence, POR, prevalence odds ratio.

[a]Construction industry workers who reported “working at a job or business”; “with a job or business but not at work”; or “working, but not for pay, at a family-owned job or business” any time in the 12 months prior to the interview.

[b]Cigarette smokers were defined as persons who reported smoking ≥100 cigarettes during their lifetime and who currently smoke every day or some days (estimated n = 22.8 million).

[c]Other combustible tobacco product users were defined as persons who reported smoking cigars, cigarillos, or little filtered cigars or smoking tobacco in a regular pipe, water pipe, or hookah at least once during their lifetime and who currently use every day or some days (n = 8.4 million).

[d]Smokeless tobacco product users were defined as persons who reported using chewing tobacco, snuff, dip, snus, or dissolvable tobacco at least once during their lifetime and who currently use every day or some days (n = 4.4 million).

[e]E-cigarette users were defined as persons reported who reported using electronic cigarettes at least once during their lifetime and who currently use every day or some days (n = 5.2 million).

[f]Persons who reported current use of two or more individual tobacco products (n = 6.9 million).

[g]Any tobacco product users were defined as persons who reported current use of cigarettes or other combustible tobacco or smokeless tobacco or e-cigarettes every day or some days (estimated n = 32.7 million).

[h]POR adjusted for age, gender, race education, income, and region and reference group is non-construction workers. POR defined as the odds of using tobacco product among specific groups in the construction workers as compared with non-construction workers.

[i]Statistically significant differences (P < 0.05).

[j]Estimate suppressed (relative standard error >30%).

[k]https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf.

[l]Former smokers were respondents who reported having smoked at least 100 cigarettes during their lifetime and currently did not smoke. Never smokers were respondents who had smoked less than 100 cigarettes during their lifetime.

TABLE 2

Prevalence odds ratios for tobacco use and selected health conditions among construction workers—2014–2016

	Construction workers compared with all other workers		Combustible tobacco use		Smokeless tobacco use		E-cigarette use		Any tobacco use	
Health characteristics	**POR[a]**	**95%CI**	**POR[b]**	**95%CI**	**POR[b]**	**95%CI**	**POR[b]**	**95%CI**	**POR[b]**	**95%CI**
Health status										
Mental health	0.9	0.7–1.1	1.0	0.7–1.4	0.7	0.4–1.1	0.9	0.5–1.6	0.9	0.6–1.2
Physical health	1.1	0.9–1.3	2.1[c]	1.5–3.0	1.0	0.6–1.7	0.7	0.4–1.4	1.9[c]	1.3–2.6
Selected health conditions										
COPD	0.8	0.6–1.1	3.3[c]	1.8–6.1	1.5	0.5–4.2	2.0	0.8–5.2	3.2[c]	1.7–5.9
Current asthma	0.7	0.6–0.9	1.3	0.9–2.1	1.3	0.7–2.4	1.4	0.7–3.0	1.6[c]	1.0–2.4
Heart disease	0.8	0.7–1.0	1.4	0.9–2.2	1.7	0.9–3.4	0.6	0.3–1.6	1.4	0.9–2.1
Hypertension	0.9	0.8–1.0	1.2	0.9–1.5	1.9[c]	1.3–2.8	0.8	0.5–1.5	1.3	1.0–1.6
Any cancer	1.1	0.9–1.3	1.8[c]	1.1–2.8	1.1	0.5–2.3	2.2	0.8–6.7	1.6[c]	1.1–2.5
Multiple health conditions[d]	0.8	0.7–1.0	2.1[c]	1.4–3.2	1.9	0.9–4.1	0.8	0.3–2.1	2.0[c]	1.4–3.0
Work loss days (≥1 days)[e]	0.9	0.8–0.9	1.4[c]	1.2–1.7	1.6[c]	1.2–2.2	1.0	0.7–1.5	1.6[c]	1.3–2.0

POR, prevalence odds ratio.

[a]POR is defined as the odds of having a selected health among construction workers as compared with non-construction workers. POR adjusted for age, race gender education, income, and region.

[b]POR defined as the odds of construction workers using tobacco products (combustible, smokeless, e-cigarettes, any tobacco) and having a selected health outcome compared with those with no tobacco product use and not having the selected health outcome.

[c]Statistically significant differences ($P < 0.05$).

[d]Self-reported physician diagnosis of COPD or heart disease/condition or hypertension or current asthma or any cancer (two or more health condition).

[e]Missed work days at a job or business because of illness or injury (maternity leave not included) in the 12 months prior to the survey.

TABLE 3

Any tobacco use by organizational and worker characteristics—2015

	Construction workers[a]					Non-construction workers					Construction workers compared with non-construction workers	
		Any tobacco use					Any tobacco use					
Characteristics	**NX1000 (%)**	***P***	**95%CI**	**POR[b]**	**95%CI**	**NX1000 (%)**	***P***	**95%CI**	**POR[b]**	**95%CI**	**POR[c]**	**95%CI**
Worker class												
Private company	7421 (75.5)	34.4	30.2–38.7	1.0	-	114 198 (75.5)	22.2	21.3–23.2	1.0	-	1.7[d]	1.4–2.0
Government	246 (2.5)	23.0	8.4–37.6	0.9	0.4–2.3	24 442 (16.2)	13.7	12.1–15.2	0.6	0.5–0.8	1.7	0.8–3.9
Self employed	2149 (21.9)	30.0	23.1–36.9	0.2	0.1–2.9	12 246 (8.1)	16.2	13.7–18.7	0.6	0.2–1.8	-	-
Work arrangement												
Standard	5680 (62.9)	33.7	28.9–38.6	1.0	-	115 411 (84.0)	20.3	19.4–21.2	1.0	-	1.6[d]	1.3–2.1
Independent	2079 (23.0)	30.5	23.9–37.2	1.2	0.6–2.2	12 500 (9.1)	17.5	14.9–20.1	0.9	0.7–1.3	2.5[d]	1.4–4.5
Temp	749 (8.3)	38.3	24.5–52.0	1.4	0.7–2.8	3391 (2.5)	30.3	24.3–36.5	1.6	0.9–2.6	1.4	0.7–2.9
Other	522 (5.8)	-	-			6044 (4.4)	17.1	13.7–20.4	0.7	0.4–0.9	-	-
Size of establishment												
<50 employees	7368 (77.1)	34.4	30.2–38.6	1.4	0.7–3.0	75 682 (51.4)	21.8	20.5–23.0	1.2	1.0–1.4	1.9[d]	1.4–2.4
50–250 employees	1371 (14.3)	29.2	20.7–37.7	1.1	0.5–2.8	34 315 (23.3)	21.1	18.5–22.8	1.2	1.0–1.4	1.2	0.8–1.9
≥250 employees	819 (8.6)	28.3	15.4–41.2	1.0	-	37 137 (25.2)	17.3	15.8–18.8	1.0	-	1.4	0.7–2.9
Number of years on the job												
≤5 years	3224 (40.4)	38.1	33.1–43.1	1.3	0.8–2.2	84 580 (46.2)	23.5	22.5–24.5	1.3[d]	1.1–1.5	1.9[d]	1.3–2.6
>5 years	4764 (59.6)	28.1	23.4–32.9	1.0	-	66 272 (53.8)	16.3	15.1–17.5	1.0	-	1.6[d]	1.4–2.5
Second hand smoke exposure[e]												
Yes	4444 (49.4)	44.5	38.7–50.4	3.0[d]	1.9–4.7	30 004 (21.9)	34.9	32.9–36.9	2.8[d]	2.4–3.2	1.2	0.9–1.7
No	4561 (50.6)	21.0	16.6–25.4	1.0	-	107 248 (78.1)	16.0	15.1–16.8	1.0	-	1.3[d]	1.0–1.8
Work-family imbalance[f]												
Agree/strongly agree	2181 (24.2)	33.9	26.8–40.9[a]	1.1	0.7–1.9	35 009 (25.5)	21.8	20.2–23.5	1.1	1.0–1.3	1.5[d]	1.0–2.3

	Construction workers[a]					Non-construction workers					Construction workers compared with non-construction workers	
		Any tobacco use					Any tobacco use					
Characteristics	**NX1000 (%)**	***P***	**95%CI**	**POR[b]**	**95%CI**	**NX1000 (%)**	***P***	**95%CI**	**POR[b]**	**95%CI**	**POR[c]**	**95%CI**
Disagree/strongly disagree	6815 (75.8)	32.3	27.9–36.7	1.0	-	102 076 (74.5)	19.6	18.6–20.4	1.0	-	1.7[d]	1.4–2.2
Job insecurity[g]												
Yes	1074 (11.9)	37.7	26.6–48.9	1.4	0.6–3.1	15 004 (10.9)	22.0	19.8–24.3	1.1	1.0–1.3	1.8[d]	1.0–3.5
No	7925 (88.1)	31.7	27.7–35.7	1.0	-	122 126 (89.1)	19.9	19.1–20.8	1.0	-	1.7[d]	1.4–2.1
Work demand[h]												
Agree/strongly agree	7927 (87.9)	32.3	28.3–36.3	0.6	0.3–1.3	117 195 (85.4)	20.2	19.4–21.1	1.0	1.0–1.2	1.6[d]	1.3–2.0
Disagree/strongly disagree	1089 (12.1)	35.0	23.7–46.3	1.0	-	19 957 (14.6)	19.3	17.3–21.3	1.0	-	2.2[d]	1.2–4.1
Work place safety[i]												
Safe	8294 (92.6)	31.9	28.1–35.7	1.0	-	131 467 (95.8)	19.8	18.9–20.6	1.0	-	1.7[d]	1.4–2.0
Unsafe	664 (7.4)	39.9	26.2–53.7	0.9	0.4–2.1	5835 (4.2)	28.6	24.6–32.6	1.7[d]	1.3–2.1	1.0	0.5–2.0
Support from supervisors[j]												
Agree/strongly agree	6419 (91.4)	32.4	28.0–36.9	1.0	-	112 951 (90.0)	20	19.1–20.9	1.0	-	1.7[d]	1.4–2.1
Disagree/strongly disagree	606 (8.6)	42.7	27.5–57.9	1.1	0.5–2.3	12 531 (10.0)	25.3	22.4–28.3	1.3[d]	1.0–1.6	1.8	0.9–3.6
Health/safety important to management[k]												
Agree/strongly agree	6667 (94.0)	33.5	29.2–37.8	1.0	-	119 031 (94.5)	20.1	19.2–21.0	1.0	-	1.7[d]	1.4–2.1
Disagree/strongly disagree	427 (6.0)	29.7	14.4–45.1	0.5	0.1–1.7	6960 (5.5)	25.6	21.9–29.3	1.0	0.7–1.3	1.1	0.5–2.5
Health promotion[l]												
Yes	1686 (23.9)	32.8	22.9–42.7	1.0	-	60 018 (48.0)	18.3	17.0–19.6	1.0	-	1.8[d]	1.1–2.9
No	5365 (76.1)	33.4	28.4–38.3	0.9	0.4–1.6	64 945 (52.0)	22.6	21.3–23.8	1.0	0.9–1.2	1.6[d]	1.3–2.0
Health promotion participation (yes)												
Participates	920 (54.8)	27.3	14.6–40.1	1.0	-	32 267 (53.8)	16.6	15.0–18.2	1.0	-	1.5	0.8–2.9
Do not participate	766 (45.4)	39.4	24.4–54.2	1.8	0.7–4.9	27 751 (46.2)	20.3	18.4–22.2	1.2[d]	1.0–1.4	2.3[d]	1.2–4.5

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P, prevalence. Totals may not add up due to rounding, unknown and missing values; Non-construction workers include all other workers (n = _150 875 491).

[a]Weighted to provide national annual average estimates for currently employment construction workers.

[b]Prevalence odds ratio; adjusted for age, work-family imbalance, job insecurity, work demand, workplace safety, job support, years on the job, establishment size, work arrangement, worker class, POR is defined as the odds of using tobacco products within construction and odds of using tobacco within non construction separately, compared with the referent group as noted in table.

[c]Prevalence odds ratio; adjusted for age, work-family imbalance, job insecurity, work demand, workplace safety, job support, years on the job, establishment size, work arrangement, worker class, Reference group includes non-construction workers. POR is defined as the odds of using tobacco products among construction workers compared with the odds among non-construction workers.

[d]Statistically significant differences ($P < 0.05$).

[e]Responded “yes” to the question “in past 12 months, while at work, how often were you exposed to tobacco smoke from other people?”

[f]Responded strongly agree/agree or disagree/strongly disagree to the question, “Does your Job interfere with personal or family life/”

[g]Responded yes/no to the question, to worried about losing job?

[h]Responded strongly agree/agree or disagree/strongly disagree to the question, “Do you have enough time to get the job done?”

[i]Responded very unsafe/unsafe or safe/very safe to the question, “How safe do you think your workplace is?”

[j]Responded strongly agree/agree or disagree/strongly disagree to the question, “Can you count on your supervisor or manager for support when you need it?”

[k]Responded strongly agree/ agree, or disagree/strongly disagree to the question, “Is health and safety of workers is a high priority with management at work?”

[l]Responded “yes” to the question, “In the past year, were health promotion programs made available to you by your employer? Examples of health promotion?” programs include education about weight management, smoking cessation, screening for high blood pressure, high cholesterol, or other health risks, and onsite fitness facilities or discounted gym memberships.

TABLE 4

Proportion of construction industry workers using tobacco, by occupation and tobacco product—2014–2016

Construction occupations	Estimated workers[a] Nx1000	Cigarette[b] smokers % (95%CI)	Cigars, cigarillos, pipe, hookah[c] use % (95%CI)	Smokeless[d] tobacco use % (95%CI)	E-cigarette[e] use % (95%CI)	Multiple[f] tobacco use (≥2 products) % (95%CI)	Any tobacco use[g] % (95%CI)
Management	1347	18.4 (13.6–23.2)	12.0 (8.4–15.6)	5.7 (3.5–7.9)	5.7 (3.0–8.5)	6.7 (3.8–9.6)	32.8 (27.4–38.1)
Office & administrative support	503	17.5 (10.5–24.6)	-[h]	-	-	-	22.3 (14.6–30.0)
Supervisors, construction, & extraction	646	23.8 (15.8–31.7)	-	13.8 (8.0–19.6)	-	-	39.8 (31.4–48.2)
Construction trade	5960	27.2 (24.7–29.8)	8.0 (6.4−9.7)	8.0 (6.4–9.5)	4.3 (3.1–5.6)	8.7 (7.0–10.4)	36.5 (33.7−39.2)
Installation, maintenance, & repair	601	25.5 (17.7–33.3)	9.1 (4.6−13.5)	13.2 (7.4–19.0)	8.3 (3.0–13.6)	9.9 (4.5–15.0)	42.5 (34.0–51.0)
Production, transportation, warehousing	514	19.7 (14.3–25.1)	6.8 (1.7−11.9)	6.2 (2.5–9.7)	-	6.6 (2.5–10.8)	31.5 (21.8–41.1)
All other construction	637	23.4 (16.4–30.4)	9.4 (4.6–14.2)	-	-	-	28.3 (20.5–36.1)
Unknown/missing	9	-	-	-	-	-	-

CI, confidence interval.

[a] Weighted to provide national annual average estimates for current employment.

[b] Cigarette smokers were defined as persons who reported smoking ≥100 cigarettes during their lifetime and who currently smoke every day or some days (n = 22.8 million).

[c] Other combustible tobacco product users were defined as persons who reported smoking cigars, cigarillos, or little filtered cigars or smoking tobacco in a regular pipe, water pipe, or hookah at least once during their lifetime and who currently use every day or some days (n = 8.4 million).

[d] Smokeless tobacco product users were defined as persons who reported using chewing tobacco, snuff, dip, snus, or dissolvable tobacco at least once during their lifetime and who currently use every day or some days (estimated n = 4.4 million).

[e] E-cigarette users were defined as persons reported who reported using electronic cigarettes at least once during their lifetime and who currently use every day or some days (n = 5.2 million).

[f] Multiple tobacco use was defined as current use of two or more individual tobacco products (n = 6.9 million).

[g] Any tobacco product users were defined as persons who reported current use of cigarettes or other combustible tobacco or smokeless tobacco or e-cigarettes every day or some days (n = 32.7 million).

[h] Estimate suppressed (relative standard error >30%).

TABLE 5

Proportion of construction industry workers exposed to second hand smoke, by tobacco use status and occupation—2015

		Second hand smoke exposure					
		Combustible[b] tobacco product		Non-combustible[c] tobacco product		Any tobacco product	
	Overall second hand smoke exposure[a]	Users	Non users	Users	Non users	Users	Non users
Construction occupations	% (95%CI)	% (95%CI)	% (95%CI)	% (95%CI)	% (95%CI)	% (95%CI)	% (95%C1)
Management	39.3 (28.6–50.1)	65.4 (45.2–85.5)	30.4 (19.241.6)	56.4 (18.6–94.2)	38.6 (27.1–50.1)	63.7 (45.2–82.1)	29.1(17.4–40.7)
Office & administrative support	28.0 (10245.8)	-	-	-	28.6 (10.047.1)	-	-
Supervisors, construction, & extraction	62.8 (482–77.3)	74.7 (56.8–92.7)	58.8 (41.3–76.4)	-	56.4 (39.7–73.2)	81.1 (67.7–94.6)	53.6 (342–73.0)
Construction trade	53.4 (48.5–58.3)	72.1 (64.1–80.2)	45.6 (39.8–5L5)	51.3 (29.9–73.3)	53.8 (48.4–59.1)	69.5 (61.7–77.3)	45.3 (39.3–51.3)
Installation, maintenance, & repair	44.1 (26.7–61.4)	74.6 (43.1–100.0)	382 (19.7–56.6)	64.3 (27.3–100.0)	382 (17.9–58.5)	72.1 (46.3–97.9)	-
Production, transportation, warehousing	55.6 (35.7–75.6)	60.9 (28.493.3)	53.0 (29.3–76.8)	-	58.4 (36.8–80.1)	59.3 (29.2–89.5)	53.5 (28.7–78.3)
All other construction workers	39.1 (23.6–54.5)	76.6 (55.6–97.7)	26.9 (11.5–42.3)	-	432 (26.7–59.6)	59.5 (26.0–93.0)	28.5 (12.4–44.7)
Total	49.4 (45.6–53.1)	70.0 (63.3–76.7)	41.6 (37.246.0)	55.6 (39.7–71.6)	49.1 (44.9–53.3)	67.4 (61.0–73.8)	40.6 (35945.3)

[a]Responded “yes” to the question “In the past 12 months, while at work, how often were you exposed to tobacco smoke from other people?” (n = 4 444 213).

[b]Combustible tobacco product users were defined as persons who reported smoking cigarette and/or smoking cigars, cigarillos, or little filtered cigars or smoking tobacco in a regular pipe, water pipe, or hookah at least once during their lifetime and who currently use every day or some days.

[c]Non-combustible tobacco product users were defined as persons who reported using chewing tobacco, snuff, dip, snus, or dissolvable tobacco at least once during their lifetime and who currently use every day or some days.