Cigarette Smoking and Advice to Quit in a National Sample of Homeless Adults

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Background: Cigarette smoking is common among homeless people, but its characteristics in this vulnerable population have not been studied at a national level. Whether homeless smokers receive advice to quit from healthcare providers is also unknown.

Purpose: To determine the prevalence and predictors of current cigarette smoking, smoking cessation, and receipt of clinician advice to quit in a national sample of homeless adults.

Methods: This study analyzed data from 966 adult respondents to the 2003 Health Care for the Homeless User Survey, representing more than 436,000 people nationally. Using multivariable logistic regression, the independent predictors of smoking, quitting, and receiving advice to quit were identified. Analyses were conducted in 2008–2009.

Results: The prevalence of current smoking was 73%. The lifetime quit rate among ever smokers was 9%. Among past-year smokers, 54% reported receiving clinician advice to quit. Factors independently associated with current smoking included out-of-home placement in childhood (AOR=2.79, 95% CI=1.03, 7.52); victimization while homeless (AOR=2.36, 95% CI=1.15, 4.83); past-year employment (AOR=2.52, 95% CI=1.13, 5.58); and prior illicit drug use (AOR=7.21, 95% CI=3.11, 16.7) or problem alcohol use (AOR=7.42, 95% CI=2.51, 21.9). Respondents with multiple homeless episodes had higher odds of receiving quit advice (AOR=2.51, 95% CI=1.30, 4.83) but lower odds of quitting (AOR=0.47, 95% CI=0.29, 0.78).

Conclusions: Compared to the general population, homeless people are far more likely to smoke and much less likely to quit, even though more than half of smokers received quit advice in the past year. Interventions for homeless smokers should address the unique comorbidities and vulnerabilities of this population.
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Introduction

Cigarette smoking is common among homeless people,[1–7] contributing to the high prevalence of acute and chronic illness in this population.[8–10] Obstructive lung disease is more than twice as prevalent in homeless people than in the general population,[2] and the rates of death from cardiovascular, pulmonary, and other smoking-related causes are substantial.[11–13] Despite this, the characteristics and natural history of smoking behavior in a homeless population are not well described. The high prevalence of tobacco use among homeless people is commonly attributed to the disproportionate burden of substance abuse and mental illness, superimposed on a background of heightened personal stress and social chaos.[14,15] Yet the independent contributions of these and other factors unique to homelessness on smoking behavior have not been assessed.

Furthermore, the extent to which smoking is addressed by clinicians caring for this population is not known. Evidence-based guidelines direct healthcare providers to address tobacco use routinely when a smoker makes an office visit,[16] because even brief advice improves cessation rates.[17,18] In the setting of homelessness, however, tobacco use may be overshadowed by more urgent medical, psychiatric, and social concerns at clinical encounters.[14] Also, clinicians may

be unaware that many homeless smokers are interested in quitting.[19,20]

Understanding the pattern of tobacco use among homeless individuals at a national level would provide valuable insight into what components might be needed for effective intervention strategies for this vulnerable population. To address this gap in evidence, data from a unique national survey of homeless adults were analyzed to determine the prevalence and correlates of current cigarette smoking, smoking cessation, and receipt of clinician advice to quit.

Methods

Data Source

In 2008–2009, the authors performed a secondary analysis of the 2003 Health Care for the Homeless (HCH) User Survey, the first nationally representative survey of people using clinical services provided by the federally funded HCH program. The HCH User Survey was administered by Research Triangle Institute (RTI) International in collaboration with the Health Resources and Services Administration's Bureau of Primary HealthCare.

Participants and Setting

A three-stage sampling design was used to conduct the survey.[21] Of 131 HCH grantees that had been in operation for at least 1 year, 30 were sampled using a geographically stratified probability-proportional-to-size (PPS) technique. Interviews were conducted in person by RTI field staff at a PPS sample of 79 HCH clinic sites operated by the 30 grantees. The target population was defined as people receiving face-to-face services from an HCH provider. Individuals were eligible if they had received such services at least once in the year prior to the survey, because the reference period for many of the questions was 12 months. Participants were selected consecutively with a goal of 33 interviews per grantee. Respondents provided informed consent, and the study was approved by the RTI International IRB.

Of 1444 selected people, 11 were subsequently found to be ineligible, and 416 refused or did not complete the survey. The total number of completed interviews was 1017, yielding a response rate of 70%. This analysis was confined to the 966 respondents who were aged ≥18 years, representing more than 436,000 adult HCH clinic users.

Definitions of Smoking Behavior and Outcomes

Three outcomes were analyzed: (1) current smoking; (2) smoking cessation; and (3) receipt of clinician advice to quit smoking. Smoking status was defined in response to the following two questions: *Have you ever smoked at least 100 cigarettes in your entire life?* and *How long has it been since you last smoked a cigarette?* Response categories for the second question were *within the past 30 days*, *more than 30 days, but within the past 12 months*, and *more than 12 months ago*. Respondents who had ever smoked at least 100 ciga-

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rettes were defined as ever smokers, and respondents who had never smoked 100 cigarettes were classified as never smokers.[22] Among ever smokers, those who had smoked within the past 30 days were considered current smokers, whereas those who had not smoked within the past 30 days were considered former smokers. The quit ratio was defined as the percentage of ever smokers who were former smokers.[23] Receipt of past-year quit advice by an HCH provider was assessed with the following question: *During the past 12 months, did anyone at the HCH Health Center advise you to stop smoking for more than one day?*

Covariates of Interest

Sociodemographic variables included age (18–29, 30–44, ≥45 years); gender; self-reported race/ethnicity (white non-Hispanic, black non-Hispanic, other non-Hispanic, and Hispanic); veteran status; marital status (married/partnered versus not); educational attainment (high school diploma or higher versus less than high school diploma); and employment (any past-year work for pay).

Features of homelessness included out-of-home placement as a minor (placement into a foster home, group home, or other institution before age 18 years); the lifetime number of homeless episodes lasting at least 30 days (0, 1, 2 or more); victimization history (physical or sexual assault while homeless); and food insufficiency (*sometimes* or *often* not getting enough food to eat[24–29]).

Comorbid psychiatric and addictive disorders included a history of mental illness, illicit drug use, or problem alcohol use. Mental illness history was defined as any past inpatient or outpatient treatment for "emotional or mental problems." Illicit drug use history was defined as any past or current use of illicit or nonprescribed controlled substances, or any history of drug treatment. Problem alcohol use history was defined as consuming ≥5 drinks on a single occasion at least once in the past month,[30] consuming ≥3 drinks on a typical day of drinking in the past month,[31] or any history of alcohol treatment.

In the smoking-cessation and quit-advice analyses, the following smoking-attributable medical comorbidities were considered: obstructive lung disease (asthma, chronic bronchitis, and COPD/ emphysema); cardiovascular disease (coronary artery disease or stroke); hypertension; and any cancer diagnosis. The duration of time followed by the HCH clinic site was included in the quit advice analysis to account for differences in opportunity for advice.

Statistical Analysis

The authors calculated the prevalence of current smoking among all adults, the prevalence of smoking cessation among ever smokers (i.e., quit ratio), and the prevalence of past-year quit advice among ever smokers who had smoked at any time in the preceding year. The unadjusted relationships between these outcomes and the predictors of interest were examined using chi-square tests. Separate multivariable logistic regression models were then constructed to determine the factors independently associated with each outcome. In the multivariable model for current smoking, former smokers were excluded from the analysis in order to better compare current and never smokers.[32]

In the smoking-cessation model, former smokers were compared to current smokers to determine the factors associated with quitting. In the quit-advice model, all past-year smokers were analyzed to determine the factors associated with receiving advice to stop smoking. For the current smoking and quit advice outcomes, all hypothesized variables were entered into the regression models. For the smoking-cessation outcome, the limited number of quit events restricted the number of predictors that could be entered into the regression model;[33] therefore, only variables with univariate significance of $p<0.05$ were entered into the model to avoid overfitting. Respondents with missing data for a predictor or outcome were excluded from any analysis involving the variable. Smoking status was missing for three respondents. There were no missing data for quit advice. Item nonresponse for predictors of interest was generally minimal (range=0%–3.6%).

Because of the complex sampling design of the survey, all analyses were performed on SAS-Callable SUDAAN, release 10.0, using weights developed by RTI that incorporated sampling probability, survey nonresponse, and poststratification adjustment to reduce bias in the study estimates and better reflect the target population.[21] Descriptive data are presented as unweighted numbers and weighted percentages. Results were considered significant at $p<0.05$.

Results

Respondent Characteristics

Fifty-eight percent of respondents were male (Table 1). The median age was 41 years. Most participants were white (39%) or black (38%) non-Hispanics. In comparison to the 2003 U.S. general population, this sample of homeless adults had a greater proportion of non-Hispanic blacks and a lower proportion of high school graduates.[34]

More than half of respondents had worked in the past year. Nearly one fourth had a history of out-of-home placement in childhood. One in three reported being physically or sexually assaulted while homeless. Almost half had a history of mental illness. The lifetime prevalence of illicit drug use (83%) and problem alcohol use (52%) was substantial.

Current Smoking

Overall, 73% of respondents were current smokers, 7% were former smokers, and 20% were never smokers (Table 2). Among current smokers (n=677), the mean number of cigarettes consumed per day was 14 (SE=0.8). Thirty-five percent (n=231) of current smokers consumed ≥20 cigarettes per day on average over the past month, and 84% (n=572) smoked every day of the past month.

The prevalence of current smoking was higher in men than women and in whites than nonwhites (Table 2). Within these sociodemographic categories, the prevalence of smoking ranged from 84% among white men

Table 1. Characteristics of the study sample (*n*=966)

Characteristics	n (%)[a]
SOCIODEMOGRAPHIC CHARACTERISTICS	
Age (years)	
18–29	113 (18.3)
30–44	395 (50.3)
≥45	458 (31.5)
Gender, male	591 (58.2)
Race/ethnicity	
White non-Hispanic	334 (39.2)
Black non-Hispanic	382 (38.1)
Other non-Hispanic	66 (5.3)
Hispanic	172 (16.1)
Veteran	119 (11.5)
Married/partnered	127 (14.3)
High school diploma	580 (58.7)
Employed, past year	485 (54.5)
FEATURES OF HOMELESSNESS	
Out-of-home placement as a minor[b]	204 (23.8)
Homeless episodes lasting ≥30 days	
0	198 (16.8)
1	249 (26.3)
≥2	498 (55.3)
Food insufficiency[c]	235 (25.4)
Physical/sexual assault history	291 (32.8)
PSYCHIATRIC/ADDICTIVE DISORDERS	
Mental illness history	429 (47.6)
Illicit drug use history	
Lifetime	778 (82.6)
Past year	522 (56.3)
Problem alcohol use history	
Lifetime	502 (52.0)
Past year	383 (39.7)
MEDICAL CONDITIONS	
Obstructive lung disease	315 (36.4)
Cardiovascular disease	107 (8.8)
Hypertension	308 (28.5)
Cancer	54 (7.0)

Data source: 2003 Health Care for the Homeless User Survey, Health Resources and Services Administration
[a]Sample sizes are unweighted. Percentages are weighted to be nationally representative of adult Health Care for the Homeless clinic users, with sampling weights provided by Research Triangle Institute International. Percentages within categories may not total 100 because of rounding or item nonresponse.
[b]Defined as placement into a foster home, group home, or other institution before age 18 years
[c]Defined as *sometimes* or *often* not getting enough to eat

Table 2. Smoking status and predictors of current smoking

Characteristics	Smoking status (n=966)[a]			Current vs never smoking (n=877)[b] adjusted OR (95% CI)
	% current	% former	% never	
Overall	72.7	7.4	19.7	
SOCIODEMOGRAPHIC CHARACTERISTICS				
Age (years)				
18–29	68.9	2.1	28.2	1.00 (ref)
30–44	73.4	7.5	19.0	2.13 (0.92, 4.94)
≥45	73.7	10.3	15.9	**6.16 (2.30, 16.5)**
Gender				
Female	61.5	7.0	31.1	1.00 (ref)
Male	80.3	7.8	11.8	3.00 (0.95, 9.49)
Race/ethnicity				
White non-Hispanic	80.8	6.1	12.7	1.00 (ref)
Black non-Hispanic	72.0	6.7	21.0	0.81 (0.34, 1.94)
Other non-Hispanic	72.0	14.9	13.1	0.34 (0.11, 1.09)
Hispanic	54.6	10.1	35.3	0.33 (0.07, 1.43)
Veteran				
No	72.7	7.8	19.3	1.00 (ref)
Yes	72.2	4.3	22.8	**0.16 (0.06, 0.45)**
Married/partnered				
No	75.5	7.6	16.6	1.00 (ref)
Yes	55.6	6.6	37.8	1.51 (0.72, 3.18)
High school diploma				
No	71.4	7.1	21.3	1.00 (ref)
Yes	73.5	7.6	18.6	0.57 (0.28, 1.15)
Employed, past year				
No	65.2	7.8	27.0	1.00 (ref)
Yes	78.8	7.1	13.7	**2.52 (1.13, 5.58)**
FEATURES OF HOMELESSNESS				
Out-of-home placement as a minor[c]				
No	68.9	6.5	24.3	1.00 (ref)
Yes	82.0	10.9	7.1	**2.79 (1.03, 7.52)**
Homeless episodes lasting ≥30 days				
0	53.9	7.9	38.2	1.00 (ref)
1	72.3	10.6	17.1	1.80 (0.67, 4.81)
≥2	78.5	5.8	15.4	0.94 (0.32, 2.78)
Food insufficiency[d]				
No	72.1	6.9	20.8	1.00 (ref)
Yes	74.6	6.2	19.2	1.27 (0.67, 2.41)
				(continued on next page)

Table 2. Smoking status and predictors of current smoking *(continued)*

Characteristics	Smoking status (n=966)[a]			Current vs never smoking (n=877)[b] adjusted OR (95% CI)
	% current	% former	% never	
Physical/sexual assault history				
No	68.5	6.4	24.9	1.00 (ref)
Yes	81.7	9.5	8.8	**2.36 (1.15, 4.83)**
PSYCHIATRIC/ADDICTIVE DISORDERS				
Mental illness history				
No	66.8	6.9	26.3	1.00 (ref)
Yes	79.3	8.1	12.4	2.02 (0.88, 4.66)
Illicit drug use, lifetime				
No	32.4	7.2	60.4	1.00 (ref)
Yes	81.2	7.4	11.2	**7.21 (3.11, 16.7)**
Problem alcohol use, lifetime				
No	56.4	8.1	35.2	1.00 (ref)
Yes	87.9	6.8	5.3	**7.42 (2.51, 21.9)**

Data source: 2003 Health Care for the Homeless User Survey, Health Resources and Services Administration
Note: Percentages are expressed as a function of row totals. Percentages are weighted to be nationally representative of adult HCH clinic users, with sampling weights provided by Research Triangle Institute International. Boldface indicates significance.
[a]Denominator is entire study sample (n=966). Current smoking = ever smoked 100 cigarettes and smoked in past 30 days; former smoking = ever smoked 100 cigarettes and has not smoked in past 30 days; never smoking = never smoked at least 100 cigarettes.
[b]Denominator consists of current and never smokers (n=877); former smokers are excluded from this analysis. The multivariable model is adjusted for all variables displayed in the table using logistic regression.
[c]Defined as placement into a foster home, group home, or other institution before age 18 years
[d]Defined as *sometimes* or *often* not getting enough to eat

(n=223) to 25% among Hispanic women (n=96). Respondents with any past-year employment had a higher prevalence of current smoking than those who did not work. Current smoking prevalence increased with the number of homeless episodes, and was higher among respondents with a history of out-of-home placement in youth or victimization while homeless. The prevalence of smoking was also high among respondents with a mental illness history (79%); illicit drug use history (81%); and problem alcohol use history (88%). Of current smokers, 95% had a lifetime history of either illicit drug use or problem alcohol use, and 76% had abused any substance in the past year.

In the multivariable analysis of current and never smokers, the factors independently associated with current smoking were age ≥45 years (AOR=6.16, 95% CI=2.30, 16.5); past-year employment (AOR=2.52, 95% CI=1.13, 5.58); out-of-home placement as a minor (AOR=2.79, 95% CI=1.03, 7.52); victimization while homeless (AOR=2.36, 95% CI=1.15, 4.83); illicit drug use history (AOR=7.21, 95% CI=3.11, 16.7); and problem alcohol use history (AOR=7.42, 95% CI=2.51, 21.9) (Table 2). After adjusting for confounders, veterans had lower odds of smoking than nonveterans (AOR=0.16,

95% CI=0.06, 0.45). Although significant in the unadjusted analysis, mental illness history was nonsignificant in the multivariable model (AOR=2.02, 95% CI=0.88, 4.66).

Smoking Cessation

Eighty-six of 763 ever smokers were former smokers, yielding a weighted quit ratio of 9% (Table 3). Among 700 past-year smokers, 4% (n=23) had quit. In the multivariable analysis, Hispanic respondents and individuals with hypertension had greater odds of quitting (Table 3). Respondents with two or more homeless episodes had lower odds of quitting (AOR=0.47, 95% CI=0.29, 0.78).

Past-Year Quit Advice

Overall, 54% of past-year smokers reported receiving advice to quit (see Appendix A, available online at www.ajpm-online.net). Unadjusted advice rates were highest among respondents with obstructive lung disease (63%) and respondents who had been followed by the HCH clinic site for more than 1 year (68%). In the multivariable model, participants with any number of homeless episodes lasting at least 30 days had higher odds of receiving

Table 3. Factors associated with smoking cessation among ever smokers (*n*=763)

Characteristics	Ceased smoking (unadjusted %)[a]	Adjusted OR (95% CI) for cessation[b]
Overall	9.2	
SOCIODEMOGRAPHIC CHARACTERISTICS		
Race/ethnicity		
White non-Hispanic	7.1	1.00 (ref)
Black non-Hispanic	8.5	1.06 (0.40, 2.79)
Other non-Hispanic	17.1	2.89 (0.65, 12.9)
Hispanic	15.7	**2.45 (1.23, 4.86)**
FEATURES OF HOMELESSNESS		
Homeless episodes lasting ≥30 days		
0	12.7	1.00 (ref)
1	12.8	0.83 (0.31, 2.23)
≥2	6.9	**0.47 (0.29, 0.78)**
PSYCHIATRIC/ADDICTIVE DISORDERS		
Illicit drug use history, lifetime		
No	18.2	1.00 (ref)
Yes	8.4	0.53 (0.23, 1.21)
MEDICAL CONDITIONS		
Hypertension		
No	7.9	1.00 (ref)
Yes	12.5	**2.00 (1.36, 2.94)**

Data source: 2003 Health Care for the Homeless User Survey, Health Resources and Services Administration
Note: Percentages are expressed as a function of row totals. Percentages are weighted to be nationally representative of adult Health Care for the Homeless clinic users, with sampling weights provided by Research Triangle Institute International. Boldface indicates significance.
[a]Only variables related to the outcome at a level of *p*<0.05 are shown.
[b]Adjusted for variables with univariate significance of *p*<0.05 as displayed in the table.

advice, whereas other non-Hispanics and respondents followed by the HCH clinic site for the shortest period of time had lower odds of receiving advice (Appendix A).

Discussion

To the authors' knowledge, this is the first study to describe the smoking characteristics of a national sample of homeless adults. The 73% prevalence of current smoking in this study was 3.5 times higher than the 21% prevalence of current smoking in the adult U.S. general population the same year.[22] Conversely, the 9% quit ratio among homeless smokers was much lower than the 50% quit ratio seen in the general population of ever smokers nationally.[22] The smoking prevalence in this 2003 nationwide sample of homeless clinic users was identical to that seen in a 1987 clinic-based study of homeless people in Los Angeles.[3] However,

during the same period of time, the prevalence of current smoking decreased by 25% in the adult U.S. population.[22,35] In identifying the factors associated with smoking in the setting of homelessness, this study provides insight into why these disparities in smoking behavior may exist and how future intervention programs might address this problem.

Adverse childhood histories, victimization, and substance abuse were key predictors of smoking among homeless people in this study. Such risk factors are known to be more common among homeless people than in non-homeless populations,[36–40] and this study reinforces the high prevalence of these characteristics among homeless adults. Respondents placed out of home in youth had higher odds of current smoking even after adjusting for potential confounders such as employment status, mental illness, substance abuse, and victimization.[41–44] Adverse childhood experiences have been linked with smoking in non-homeless populations[45]; the current study extends this research in documenting the relationship between childhood out-of-home placement and smoking among homeless adults. Prior research has also demonstrated a higher prevalence of smoking among people with a history of physical or sexual assault,[46–48] and a similar association was observed in the homeless population. Post-traumatic stress disorder (PTSD) may mediate this relationship. Individuals with this disorder may use smoking to reduce the burden of negative mood symptoms,[49] suggesting that identifying and treating PTSD and other psychological sequelae of victimization may

need to be part of intervention strategies for homeless smokers.

Drug and alcohol use conferred high odds of current smoking in this homeless population, confirming a relationship that has also been observed in the general population.[50–52] Almost all (95%) of the homeless smokers in this national sample had a lifetime history of illicit drug use or problem alcohol use. Smoking-cessation programs for homeless populations may need to acknowledge and address these comorbidities. The integration of smoking-cessation services into substance abuse treatment programming may be an effective way to address tobacco use among homeless people with substance abuse problems.[53–56] Mental illness was not an independently significant predictor of current smoking in the present study, despite having a significant unadjusted relationship with this outcome. Illicit drug use, problem alcohol use, out-of-home placement in youth, and victimization appeared to be important confounders; all of these factors were seen with greater frequency among those with mental illness. After adjusting for these differences, the independent predictive significance of mental illness was lost, although the point estimate remained positive.

Homeless individuals who had worked in the past year were more likely to be smokers. This differs from the relationship observed in the general population, where the prevalence of smoking among employed people is typically lower than it is among the unemployed.[57] Three explanations may account for this. First, homeless people with past-year employment may have more money for purchasing cigarettes. Second, the blue-collar, service industry, or labor-oriented jobs often obtained by homeless people are associated with a higher prevalence of smoking in comparison to other forms of employment.[58–63] Last, the comparator group without past-year employment may be composed of individuals more accurately described as out of the labor force (i.e., not seeking work); such people appear to have a lower prevalence of smoking than those who are in the labor force but unemployed.[59,60] However, this level of detail in employment history could not be determined. Given the novelty of this finding, future studies should attempt to better elucidate the relationship between employment and smoking among homeless people, because distinct policy implications would follow from determining whether this association is driven more by financial factors or by the workplace environments often encountered by homeless workers.

The percentage of those receiving past-year quit advice was higher than expected. The 54% receiving

quit advice compared favorably to the 62% receiving quit advice in the general population of smokers.[64] Despite this, few homeless smokers quit. This highlights the need to better understand the way in which advice affects quitting, and the extent to which homeless smokers have access to additional tobacco counseling services and pharmacologic cessation aids. Although there was limited statistical power to explore the correlates of quitting, results indicated that individuals with two or more episodes of homelessness were less likely to be former smokers. This suggests that smoking cessation may be difficult to achieve when attempting to meet basic subsistence needs for shelter and safety.

Limitations

This study has certain limitations. The data analyzed were cross-sectional in nature, so causality cannot be definitively determined. All measures were self-reported and may be subject to recall and social desirability biases, particularly with respect to stigmatized behaviors and sensitive issues. The survey was conducted among people with at least one prior visit to a HCH clinic site, so the findings may not be generalizable to the homeless population as a whole, particularly those who do not routinely seek medical care. In the analysis of quit advice, the contribution of provider-level characteristics could not be determined; such information would further enhance understanding of how and when advice is given to homeless smokers. Despite these limitations, the study findings are notable for several reasons. This national study of smoking among homeless people confirms the high prevalence of smoking seen in prior single-city studies, describes the unique vulnerabilities and comorbidities of homeless smokers, and offers the first glimpse of quit advice in this population.

Conclusion

As the prevalence of smoking declines in the general population, the residual burden of tobacco use is falling disproportionately on our nation's most vulnerable people. This study provides substantial evidence that the high prevalence of smoking among homeless people is not due primarily to healthcare providers neglecting to address the topic, but more likely due to the considerable comorbidities and barriers to quitting faced by homeless smokers. Findings suggest that interventions for homeless smokers will need to be intensive and tailored to address the unique needs of this population. Expanded addiction therapy will likely be

an important component for those with comorbid substance abuse, and additional counseling may be needed for homeless adults who use smoking to cope with the long-lasting effects of adverse childhood experiences and victimization.

References

1. Connor SE, Cook RL, Herbert MI, Neal SM, Williams JT. Smoking cessation in a homeless population: there is a will, but is there a way? J Gen Intern Med 2002;17(5):369–72.
2. Snyder LD, Eisner MD. Obstructive lung disease among the urban homeless. Chest 2004;125(5):1719–25.
3. Gelberg L, Linn LS, Usatine RP, Smith MH. Health, homelessness, and poverty. A study of clinic users. Arch Intern Med 1990;150(11):2325–30.
4. Lee TC, Hanlon JG, Ben-David J, et al. Risk factors for cardiovascular disease in homeless adults. Circulation 2005;111(20):2629–35.
5. Szerlip MI, Szerlip HM. Identification of cardiovascular risk factors in homeless adults. Am J Med Sci 2002;324(5):243–6.
6. Gelberg L, Linn LS. Assessing the physical health of homeless adults. JAMA 1989;262(14):1973–9.
7. Weinreb L, Goldberg R, Perloff J. Health characteristics and medical service use patterns of sheltered homeless and low-income housed mothers. J Gen Intern Med 1998;13(6):389–97.
8. Wright JD. The health of homeless people: evidence from the National Health Care for the Homeless Program. In: Brickner PW, Scharer LK, Conanan B, Savarese M, Scanlan BC, eds. Under the safety net: the health and social welfare of the homeless in the U.S. New York: Norton, 1990:15–31.
9. Burt MR, Urban Institute. Homelessness: programs and the people they serve: findings of the National Survey of Homeless Assistance Providers and Clients: technical report. Washington DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 1999.
10. Breakey WR, Fischer PJ, Kramer M, et al. Health and mental health problems of homeless men and women in Baltimore. JAMA 1989; 262(10):1352–7.
11. Hwang SW, Orav EJ, O'Connell JJ, Lebow JM, Brennan TA. Causes of death in homeless adults in Boston. Ann Intern Med 1997;126(8):625–8.
12. Morrison DS. Homelessness as an independent risk factor for mortality: results from a retrospective cohort study. Int J Epidemiol 2009;38(3):877–83.
13. Hwang SW, Wilkins R, Tjepkema M, O'Campo PJ, Dunn JR. Mortality among residents of shelters, rooming houses, and hotels in Canada: 11 year follow-up study. BMJ 2009;339:b4036.
14. Scanlan BC, Brickner PW. Clinical concerns in the care of homeless persons. In: Brickner PW, Scharer LK, Conanan B, Savarese M, Scanlan BC, eds. Under the safety net: the health and social welfare of the homeless in the U.S. New York: Norton, 1990:69–81.
15. Okuyemi KS, Caldwell AR, Thomas JL, et al. Homelessness and smoking cessation: insights from focus groups. Nicotine Tob Res 2006; 8(2):287–96.
16. U.S. Preventive Services Task Force. Counseling and interventions to prevent tobacco use and tobacco-caused disease in adults and pregnant women: U.S. Preventive Services Task Force reaffirmation recommendation statement. Ann Intern Med 2009;150(8):551–5.
17. Fiore MC, Jaen CR, Baker TB, et al. Treating tobacco use and dependence: 2008 update. Clinical practice guideline. Rockville MD: USDHHS. Public Health Service, 2008.
18. Lancaster T, Stead L. Physician advice for smoking cessation. Cochrane Database Syst Rev 2004;(4):CD000165.
19. Arnsten JH, Reid K, Bierer M, Rigotti N. Smoking behavior and interest in quitting among homeless smokers. Addict Behav 2004; 29(6):1155–61.
20. Butler J, Okuyemi KS, Jean S, Nazir N, Ahluwalia JS, Resnicow K. Smoking characteristics of a homeless population. Subst Abus 2002;23(4):223–31.

21. Greene J, Fahrney K, Byron M. Health Care for the Homeless User/Visit Surveys, RTI Project Number 07147.021. Research Triangle Park NC: RTI International, 2004.

22. Cigarette smoking among adults—U.S., 2003. MMWR Morb Mortal Wkly Rep 2005;54(20):509 –13.

23. Giovino GA, Schooley MW, Zhu BP, et al. Surveillance for selected tobacco-use behaviors—U.S., 1900 –1994. MMWR CDC Surveill Summ 1994;43(3):1–43.

24. Alaimo K, Briefel RR, Frongillo EA Jr, Olson CM. Food insufficiency exists in the U.S.: results from the third National Health and Nutrition Examination Survey (NHANES III). Am J Public Health 1998;88(3):419 –26.

25. Alaimo K, Olson CM, Frongillo EA Jr, Briefel RR. Food insufficiency, family income, and health in U.S. preschool and school-aged children. Am J Public Health 2001;91(5):781– 6.

26. Rose D, Oliveira V. Nutrient intakes of individuals from food-insufficient households in the U.S. Am J Public Health 1997; 87(12):1956 – 61.

27. Vozoris NT, Tarasuk VS. Household food insufficiency is associated with poorer health. J Nutr 2003;133(1):120 – 6.

28. Briefel RR, Woteki CE. Development of food sufficiency questions for the Third National Health and Nutrition Examination Survey. J Nutr Educ 1992;24:24S– 8S.

29. Cristofar SP, Basiotis PP. Dietary intake and selected characteristics of women age 19 –50 years and their children age 1–5 years by reported perception of food sufficiency. J Nutr Educ 1992;24:53– 8.

30. National Institute on Alcohol Abuse and Alcoholism. NIAAA Council approves definition of binge drinking. NIAAA Newsletter (Winter). Rockville MD: USDHHS, 2004:3.

31. Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG. The alcohol use disorders test: guidelines for use in primary care, second edition. Document No. WHO/MSD/MSB/01.6a. Geneva: WHO, 2001.

32. Fagan P, Shavers V, Lawrence D, Gibson JT, Ponder P. Cigarette smoking and quitting behaviors among unemployed adults in the U.S. Nicotine Tob Res 2007;9(2):241– 8.

33. Peduzzi P, Concato J, Kemper E, Holford TR, Feinstein AR. A simulation study of the number of events per variable in logistic regression analysis. J Clin Epidemiol 1996;49(12):1373–9.

34. U.S. Census Bureau. 2003 American Community Survey: summary tables. www.census.gov/.

35. CDC. Tobacco use by adults—U.S., 1987. MMWR Morb Mortal Wkly Rep 1989;38(40):685–7.

36. Herman DB, Susser ES, Struening EL, Link BL. Adverse childhood experiences: are they risk factors for adult homelessness? Am J Public Health 1997;87(2):249 –55.

37. Koegel P, Melamid E, Burnam A. Childhood risk factors for homelessness among homeless adults. Am J Public Health 1995;85(12):1642–9.

38. Winkleby MA, Rockhill B, Jatulis D, Fortmann SP. The medical origins of homelessness. Am J Public Health 1992;82(10):1394 – 8.

39. Linn LS, Gelberg L, Leake B. Substance abuse and mental health status of homeless and domiciled low-income users of a medical clinic. Hosp Community Psychiatry 1990;41(3):306 –10.

40. Johnson TP, Fendrich M. Homelessness and drug use: evidence from a community sample. Am J Prev Med 2007;32(6S):S211– 8.

41. Tweddle A. Youth leaving care: how do they fare? New Dir Youth Dev 2007;(113):15–31, 9 –10.

42. Courtney ME, Heuring DH. The transition to adulthood for youth "aging out" of the foster care system. In: Osgood DW, Foster EM, Flanagan C, Ruth G, eds. On your own without a net: the transition to adulthood for vulnerable populations. Chicago: University of Chicago Press, 2005:27– 67.

43. Herman DB, Susser ES, Struening EL. Childhood out-of-home care and current depressive symptoms among homeless adults. Am J Public Health 1994;84(11):1849 –51.

44. Viner RM, Taylor B. Adult health and social outcomes of children who have been in public care: population-based study. Pediatrics 2005; 115(4):894 –9.

45. Anda RF, Croft JB, Felitti VJ, et al. Adverse childhood experiences and smoking during adolescence and adulthood. JAMA 1999;282(17): 1652– 8.

46. Acierno RA, Kilpatrick DG, Resnick HS, Saunders BE, Best CL. Violent assault, posttraumatic stress disorder, and depression. Risk factors for cigarette use among adult women. Behav Modif 1996;20(4):363– 84.

47. Lemon SC, Verhoek-Oftedahl W, Donnelly EF. Preventive healthcare use, smoking, and alcohol use among Rhode Island women experiencing intimate partner violence. J Womens Health Gend Based Med 2002;11(6):555– 62.

48. Weinbaum Z, Stratton TL, Chavez G, Motylewski-Link C, Barrera N, Courtney JG. Female victims of intimate partner physical domestic violence (IPP-DV), California 1998. Am J Prev Med 2001;21(4):313–9.

49. Feldner MT, Babson KA, Zvolensky MJ, et al. Posttraumatic stress symptoms and smoking to reduce negative affect: an investigation of trauma-exposed daily smokers. Addict Behav 2007;32(2):214 –27.

50. Kahler CW, Strong DR, Papandonatos GD, et al. Cigarette smoking and the lifetime alcohol involvement continuum. Drug Alcohol Depend 2008;93(1–2):111–20.

51. Stark MJ, Campbell BK. Drug use and cigarette smoking in applicants for drug abuse treatment. J Subst Abuse 1993;5(2):175– 81.

52. Giovino GA, Henningfield JE, Tomar SL, Escobedo LG, Slade J. Epidemiology of tobacco use and dependence. Epidemiol Rev 1995; 17(1):48 – 65.

53. Hwang SW, Tolomiczenko G, Kouyoumdjian FG, Garner RE. Interventions to improve the health of the homeless: a systematic review. Am J Prev Med 2005;29(4):311–9.

54. Burling TA, Burling AS, Latini D. A controlled smoking cessation trial for substance-dependent inpatients. J Consult Clin Psychol 2001;69(2):295–304.

55. Reid MS, Fallon B, Sonne S, et al. Smoking cessation treatment in community-based substance abuse rehabilitation programs. J Subst Abuse Treat 2008;35(1):68 –77.

56. Irving LM, Seidner AL, Burling TA, Thomas RG, Brenner GF. Drug and alcohol abuse inpatients' attitudes about smoking cessation. J Subst Abuse 1994;6(3):267–78.

57. Waldron I, Lye D. Employment, unemployment, occupation, and smoking. Am J Prev Med 1989;5(3):142–9.

58. Lee DJ, LeBlanc W, Fleming LE, Gomez-Marin O, Pitman T. Trends in U.S. smoking rates in occupational groups: the National Health Interview Survey 1987–1994. Occup Environ Med 2004;46(6):538 – 48.

59. Lawrence D, Fagan P, Backinger CL, Gibson JT, Hartman A. Cigarette smoking patterns among young adults aged 18 –24 years in the U.S. Nicotine Tob Res 2007;9(6):687–97.

60. Bang KM, Kim JH. Prevalence of cigarette smoking by occupation and industry in the U.S. Am J Ind Med 2001;40(3):233–9.

61. Gaudette LA, Richardson A, Huang S. Which workers smoke? Health Rep 1998;10(3):35– 45 (ENG); 35– 47 (FRE).

62. Nelson DE, Emont SL, Brackbill RM, Cameron LL, Peddicord J, Fiore MC. Cigarette smoking prevalence by occupation in the U.S. A comparison between 1978 to 1980 and 1987 to 1990. Occup Med 1994;36(5):516 –25.

63. Covey LS, Zang EA, Wynder EL. Cigarette smoking and occupational status: 1977 to 1990. Am J Public Health 1992;82(9):1230 – 4.

64. Cokkinides VE, Ward E, Jemal A, Thun MJ. Under-use of smoking-cessation treatments: results from the National Health Interview Survey, 2000. Am J Prev Med 2005;28(1):119 –22.

Supplementary Data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.amepre.2010.03.024.