

# Tobacco use among adults with disabilities in Massachusetts

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**Objectives:** To examine the characteristics of smoking among adults with disabilities in Massachusetts. **Design:** Data were obtained from the 1996–1999 Massachusetts Behavioral Risk Factor Surveillance System, a random digit dial telephone survey. Respondents reporting use of special equipment or a limitation caused by impairment or health problem were classified as having a disability. Adults with disabilities were further classified by level, based on need for assistance, and type of disability. Logistic regression models were used to assess the association between disability status and smoking.

**Setting and participants:** Random sample of non-institutionalised Massachusetts adults, 18 and older, with disabilities (n = 2985) and without disabilities (n = 14 395).

**Main outcome measures:** Smoking status, intensity, and factors related to quitting.

**Results:** Compared to those without disabilities, adults with disabilities were more likely to have ever smoked (odds ratio (OR) 1.42, 95% confidence interval (CI) 1.25 to 1.61) and to be current smokers (OR 1.52, 95% CI 1.32 to 1.76). Smoking rates varied by type of disability. Among current smokers, adults with disabilities smoked more cigarettes per day (OR 1.65, 95% CI 1.31 to 2.16), sooner after waking (OR 1.50, 95% CI 1.13 to 1.99), and were more likely to be advised by a doctor to quit (OR 2.07, 95% CI 1.60 to 2.69). Adults with disabilities who needed assistance were more likely to be planning to quit (OR 1.50, 95% CI 0.99 to 2.26).

**Conclusions:** There are disparities in smoking rates between adults with and without disabilities. Smoking cessation programmes targeted to the disabled community are needed.

An estimated 54 million Americans—approximately 20% of the population—currently have some level of disability.<sup>1</sup> The recently released Healthy People 2010 goals for the nation addresses health and wellbeing issues of people with disabilities for the first time. The 2010 goals for adults with disabilities are to promote the health of adults with disabilities, to prevent secondary conditions, and to eliminate health disparities between people with and without disabilities.<sup>2</sup>

One potential source of health disparities between adults with and without disabilities is cigarette smoking, which is the leading preventable risk factor for morbidity and mortality in the USA. Although overall smoking rates have decreased in the USA over the past 30 years, an estimated 47 million adults, or 24% of the population, still smoke.<sup>3</sup> Population surveys have shown that certain sociodemographic groups, including individuals of younger age, lower income, and lower educational attainment, continue to have high rates of tobacco use.<sup>3</sup>

Increased smoking rates among individuals with psychological or emotional disabilities have been well documented.<sup>4–6</sup> A few studies have looked at smoking rates among adults with other, specific disabilities. Iezzoni *et al* found that rates of any tobacco use were similar for adults with and without mobility impairments.<sup>7</sup> Tracy *et al* reported that smoking rates were higher among people with a mild intellectual disability compared to the general population.<sup>8</sup> Spungen *et al* found that there were no significant differences in smoking rates between male veterans with chronic spinal cord injury and the general male population, except among those age 25–44 years, where veterans with spinal cord injury were more likely to smoke.<sup>9</sup> McEntegart *et al* found similar current smoking rates in rheumatoid arthritis patients and controls, while Hutchinson *et al* found that rheumatoid arthritis patients were more likely to be current smokers compared to controls.<sup>10 11</sup> In two studies of smoking among deaf and hard of hearing adults, Barnett *et al* found no difference in smoking rates between postlingually deafened adults and hearing adults but lower smoking rates among prelingually deafened individuals compared to hearing adults, and Zazove *et al* found

that deaf and hard of hearing adults were less likely than hearing adults to ever smoke.<sup>12 13</sup> In addition, in one study of students with disabilities, Hogan *et al* found that students with disabilities were more likely to smoke cigarettes than students without disabilities.<sup>14</sup>

To our knowledge, no published studies have focused on tobacco use among a population based sample of adults with a broad range of disabilities. In this study, we examine differences in smoking rates and smoking behaviours among adults with disabilities compared to adults without disabilities in Massachusetts.

## METHODS

The data used for this analysis were collected from the 1996–1999 Massachusetts Behavioral Risk Factor Surveillance System (BRFSS), an annual, random digit dial telephone survey of non-institutionalised adults 18 years of age and older. Conducted by all states in cooperation with the Centers for Disease Control and Prevention, the BRFSS collects data on a wide variety of health characteristics, risk factors for disease, and preventive behaviours. Each Massachusetts resident has a defined probability of being selected for the survey based on factors such as number of telephones in the home, number of adults in the household, and town of residence. During 1996–1999, the percentage of completed interviews among households with an identified, eligible respondent ranged from 54–59%. Characteristics of the BRFSS are described in detail elsewhere.<sup>15</sup> Copies of the 1996–1999 Massachusetts BRFSS questionnaires are available from the authors.

In 1996 and 1997, all respondents were asked one disability screening question: “Are you limited in any way in any activities because of any impairment or health problem?” In 1998 and 1999, all respondents were asked three additional disability screening questions: (1) “Are you limited in the kind or amount of work you can do because of any impairment or health problem?” (2) “Because of any impairment or health problem, do you have any trouble learning, remembering, or concentrating?” (3) “If you use special equipment or help

**Table 1** Demographics by disability status among Massachusetts adults aged 18 years and older: Massachusetts Behavioral Risk Factor Surveillance System, 1996–1999

	Not disabled	Disabled		
	Total n=14395 (%)	Total n=2985 (%)	No assistance n=2066 (%)	Needs assistance n=908 (%)
Sex				
Male	47.3	48.6	54.3	33.7
Female	52.7	51.4	45.7	66.3
Age (years)				
18–24	14.3	7.2	9.1	2.3
25–34	24.4	13.9	15.6	9.7
35–44	22.3	16.4	16.4	16.6
45–54	15.5	17.9	17.3	19.1
55–64	9.3	14.1	14.5	13.6
65–74	8.7	15.2	15.4	14.2
75+	5.5	15.3	11.8	24.5
Mean age	42.6	52.4	50.4	57.4
Race				
White, non-Hispanic	87.5	90.3	90.8	88.4
Black, non-Hispanic	4.1	3.1	2.7	4.1
Hispanic	5.0	4.4	4.1	5.1
Other	3.4	2.3	2.4	1.9
Education				
Grades 1–11	7.1	16.5	14.0	23.1
High school or GED	28.1	31.5	29.9	35.8
Some college/tech school	26.2	24.4	25.3	22.1
College grad	38.6	27.6	30.8	19.0
Income				
<\$35000	35.4	56.2	49.5	75.5
\$35–75000	40.7	30.4	34.4	18.6
\$75000	23.9	13.5	16.1	5.9
Employment				
Employed	73.0	41.1	50.1	17.7
Unemployed	3.2	5.8	5.3	7.2
Homemaker	4.9	4.5	4.2	5.0
Student	5.2	3.2	4.2	0.9
Retired before age 65	2.0	5.4	4.6	7.3
Retired at age 65 or older	11.4	26.3	23.4	33.9
Unable to work	0.3	13.7	8.2	27.9
Type of disability				
Orthopaedic		44.5	42.7	48.6
Affective		5.6	6.5	3.5
Sensory		6.4	6.0	7.5
Chronic condition		20.5	21.2	18.9
Other		23.0	23.6	21.5
Age of onset of disability (years)				
Birth		6.3	7.6	3.0
1–14		5.8	7.5	1.5
15–29		18.2	19.8	13.9
30–44		22.9	22.2	24.6
45–64		29.6	29.8	29.4
65+		17.2	13.1	27.5

from others to get around, what type do you use?" A fourth question—"Would you describe yourself as having a disability of any kind? A disability can be physical, mental, emotional, or communication related."—was asked only of those who responded "no" to all other disability screening questions. Adults who answered yes to any of these questions were asked about the nature of their major impairment, health problem, or disability; how long their activities had been limited; and whether they needed the help of other persons in handling routine needs or personal care. Respondents who answered yes to at least one disability screening question, with the exception of the work limitation question, and who responded that their disability had been present for at least one year were classified as having a disability. Respondents who answered "no" to all screening questions were considered not to have a disability. Those who answered "yes" to the work limitation question but did not answer "yes" to any of the other disability screeners (n = 193) were excluded from the analysis for two reasons. Firstly, we are not sure how respondents understood the question. Over 30% of those who answered "yes" to

only the work limitation question were 65 years or older, almost all whom had earlier described their employment status as retired. Secondly, concerns about this question as a measure of disability have led to its exclusion from future BRFSS surveys, beginning in 2001. We note that our definition of disability is similar to the definition of disability used in HP2010.<sup>2</sup> However, our question about trouble learning, remembering or concentrating broadens the definition.

We classified individuals with disabilities into two categories based on severity of disability, as measured by whether or not they required assistance in handling routine needs or personal care. We also created four categories based on the type of limitation or disability: orthopaedic (arthritis/rheumatism, back or neck problem, fractures, bone/joint injury, walking problem), affective (depression, anxiety, emotional problem), sensory (hearing, eye/vision problem), and chronic disease (lung, breathing, or heart problem; stroke, hypertension/high blood pressure, diabetes, cancer). Finally, we grouped individuals with disabilities based on age of onset of disability.

**Table 2** Smoking status by severity, onset, and type of disability among Massachusetts adults aged 18 and older: Massachusetts Behavioral Risk Factor Surveillance System 1996–1999

	Ever smoked and current smoker*							
	Ever smoked			Current smoker		Former smoker†		
	n (total)	%	Odds ratio‡ (95% CI)	%	Odds ratio‡ (95% CI)	n (ever smoker)	%	Odds ratio‡ (95% CI)
Not disabled	14 395	45.9	1.0	19.8	1.0	6565	56.9	1.0
All disabled	2985	58.0	1.43 (1.25 to 1.61)	25.6	1.52 (1.32 to 1.76)	1725	55.9	0.75 (0.62 to 0.89)
Severity of disability								
No assistance	2066	56.2	1.36 (1.18 to 1.57)	23.0	1.30 (1.10 to 1.53)	1180	59.2	0.91 (0.73 to 1.11)
Needs assistance	908	62.1	1.57 (1.26 to 1.93)	32.5	2.28 (1.78 to 2.90)	535	47.7	0.45 (0.33 to 0.61)
Onset of disability								
Age 14 or before	305	44.9	1.03 (0.72 to 1.47)	26.8	1.08 (0.71 to 1.64)	147	40.3	0.79 (0.47 to 1.30)
After age 14	2642	59.7	1.49 (1.30 to 1.70)	25.4	1.60 (1.37 to 1.86)	1558	57.4	0.74 (0.62 to 1.08)
Type of disability								
Orthopaedic	1269	57.6	1.38 (1.15 to 1.63)	26.9	1.68 (1.37 to 2.04)	718	53.3	0.67 (0.52 to 0.86)
Affective	200	61.5	1.74 (1.11 to 2.72)	39.6	2.08 (1.27 to 3.40)	124	35.7	0.51 (0.24 to 1.06)
Sensory	172	48.1	0.98 (0.59 to 1.63)	23.1	1.61 (0.90 to 2.89)	88	52.0	0.58 (0.31 to 1.08)
Chronic condition	602	64.7	1.89 (1.46 to 2.42)	19.1	1.17 (0.87 to 1.58)	385	70.4	1.16 (0.82 to 1.63)

\*Percentage of total population. †Percentage of ever smoked. ‡Adjusted for age and education.

In 1996–1999, all respondents were asked about tobacco use. Adults who smoked 100 cigarettes in their lifetime were defined as ever smokers. Ever smokers were asked if they now smoked everyday, some days or not at all. Current smokers were defined as those who smoke “everyday or “some days”. Former smokers were defined as those who responded “not at all”. Current smokers were asked the average number of cigarettes they smoked per day, how long after waking they smoked their first cigarette, whether they made a quit attempt in the past year, whether they intended to quit smoking within the next 30 days, and whether a medical doctor or assistant had advised them to quit in the past 12 months.

### Analysis

We used logistic regression models to compare smoking rates and smoking characteristics between respondents with and without disabilities. We present adjusted odds ratios, controlling for age (18–24, 25–34, 35–44, 45–54, 55–64, 65–74, ≥ 75) and education (did not graduate from high school, high school graduate, some college, college graduate). We did not adjust for sex, which was not associated with smoking in our sample. We also did not control for race, because, after controlling for age and education, the results did not change when race was added to the models.

We wanted to avoid possible confounding by education level, which seemed likely to be associated with disability as well as smoking. However, we were concerned that disability itself might affect educational attainment, and it is inappropriate to control for a variable that is affected by the exposure or outcome.<sup>16</sup> We therefore examined the association between education and disability among individuals disabled before age 25 (where disability was most likely to have interfered with educational attainment) and among individuals disabled after age 25 (where disability was unlikely to have interfered with education, at least through college). We found that individuals disabled before age 25 had education levels similar to the non-disabled and that individuals disabled after age 25 had education levels lower than for the non-disabled. Since this analysis suggested that early onset of disability did not interfere with educational attainment in our sample, we concluded it was appropriate to control for education in all other analyses.

Because BRFSS data are weighted to account for differential probability of selection and to partially adjust for non-

response, we used SUDAAN to calculate 95% confidence intervals that took into account the survey sampling scheme and weighting of the data.<sup>17</sup>

### RESULTS

Interview data were available for 2985 adults with disabilities and 14 395 adults without disabilities over the four years examined. In 1998 and 1999 the survey included more than one disability screening question. Among those who responded affirmatively to at least one screener, 70% responded affirmatively to one screening question, 25% to two screening questions, and 5% to three screening questions. In 1998 and 1999, 7% of those with disabilities had trouble learning, remembering or concentrating because of an impairment or health problem and no other disability.

Overall, adults with disabilities were older, had less education and lower incomes, and were more likely to live alone than adults without disabilities (table 1). These differences were especially pronounced for individuals requiring assistance. Adults with disabilities not needing assistance were more likely to be men, while those needing assistance were more likely to be women. The majority of adults with disabilities had orthopaedic conditions (44%), followed by chronic conditions (20%), and sensory (6%) and affective (5%) conditions; 23% had other conditions and 2% didn't know or refused.

### Comparison of smoking rates

Individuals with disabilities were more likely to have ever smoked and to be current smokers, and less likely to have quit smoking compared to those without disabilities (table 2). Those with disabilities needing assistance were particularly more likely to be current smokers (odds ratio (OR) 2.28, 95% confidence interval (CI) 1.78 to 2.90) and less likely to have quit (OR 0.45, 95% CI 0.33 to 0.81). Individuals disabled after age 14 were more likely to ever have smoked (OR 1.49, 95% CI 1.13 to 1.70) and more likely to be current smokers than individuals without disabilities (OR 1.60, 95% CI 1.37 to 1.70). There was no difference in smoking rates between adults disabled before age 14 and adults without disabilities. The age of onset of smoking did not differ between those with and without disabilities (data not shown).

Smoking rates also varied by type of disability. Individuals with orthopaedic, affective, and sensory conditions were more

**Table 3** Measures of smoking intensity and addiction among current smokers in Massachusetts: Massachusetts Behavioral Risk Factor Surveillance System 1996–1999

	n	Everyday smoker		Smoke >20 cigarettes/day		5 minutes or less to 1st cigarette	
		%	Odds ratio* (95% CI)	%	Odds ratio* (95% CI)	%	Odds ratio* (95% CI)
Not disabled	3010	78.3	1.0	15.1	1.0	23.8	1.0
All disabled	813	83.5	1.29 (0.96 to 1.71)	24.7	1.57(1.31 to 2.16)	33.2	1.50 (1.13 to 1.99)
Severity of disability							
No assistance	543	86.1	1.64 (1.14 to 2.23)	24.2	1.63 (1.14 to 2.31)	35.2	1.67 (1.21 to 2.30)
Needs assistance	267	79.3	0.83 (0.53 to 1.31)	25.8	1.47 (0.87 to 2.47)	29.8	1.21 (0.76 to 1.92)

\*Adjusted for age and education.

**Table 4** Factors associated with quitting behaviour among current smokers in Massachusetts: Massachusetts Behavioral Risk Factor Surveillance System 1996–1999

	n	Planning to quit		Quit attempt		Advised by doctor to quit	
		%	Odds ratio* (95% CI)	%	Odds ratio* (95% CI)	%	Odds ratio* (95% CI)
Not disabled	3 010	36.5	1.0	54.9	1.0	44.7	1.0
All disabled	814	39.3	1.18 (0.92 to 1.51)	52.7	1.11 (0.87 to 1.42)	64.1	2.07 (1.60 to 2.69)
Severity of disability							
No assistance	544	37.2	1.06 (0.79 to 1.41)	54.9	1.05 (0.79 to 1.40)	58.9	1.71 (1.27 to 2.29)
Needs assistance	267	43.6	1.50 (0.99 to 2.26)	48.5	1.23 (0.82 to 1.84)	74.4	3.33 (2.11 to 5.24)

\*Adjusted for age and education.

likely to be current smokers and less likely to be former smokers than those without disabilities. Adults with chronic conditions were more likely to have ever smoked but not more likely to be current smokers than adults without disabilities. Adults with affective conditions were the most likely to be current smokers and least likely to be former smokers.

### Comparison of current smokers

Among current smokers, individuals with disabilities who did not require assistance were more likely that those without disabilities to smoke every day (OR 1.64, 95% CI 1.14 to 2.35), smoke more cigarettes per day (OR 1.63, 95% CI 1.14 to 2.31), and smoke their first cigarette within five minutes after waking, a measure of nicotine dependence (OR 1.67, 95% CI 1.21 to 2.30) (table 3). In addition, they were more likely to have been advised by a doctor to quit (OR 1.70, 95% CI 1.27 to 2.29) (table 4). Smokers with disabilities requiring assistance were more much likely than those without disabilities to have been advised by a doctor to quit (OR 3.33, 95% CI 2.11 to 5.24) and somewhat more likely to say they were planning to quit (OR 1.50, 95% CI 0.99 to 2.26) (table 4).

It is possible that the findings about doctor advice to quit may simply reflect increased interaction with the medical care system and therefore a greater opportunity for doctors to provide advice to adults with disabilities. Frequency of doctor visits was not asked in our survey. However, respondents were asked when they last had a routine checkup and adults with disabilities were more likely to have had a recent checkup. We also limited this analysis to individuals who had a checkup in the past year. Individuals with disabilities were still more likely to have been advised by a doctor to quit (data not shown).

### DISCUSSION

Our results indicate that adults with disabilities are more likely to be current smokers than adults without disabilities. Because our data are cross sectional, one concern would be that smoking caused conditions leading to disability rather than disability leading to higher smoking rates. This would be

most likely for individuals who smoked for many years and whose disability was related to a chronic condition. However, when we exclude those 40 and older with chronic disease (except diabetes for which smoking is not considered a contributing factor) from the analysis, adults with disabilities were still more likely to be current smokers than adults without disabilities. In addition, there were essentially no changes in the smoking patterns of adults with disabilities (data not shown).

Increased smoking among individuals with disabilities may be related to stress.<sup>18</sup> It has been suggested that smoking is used for stress reduction. In our sample, individuals with disabilities were much more likely to feel worried, tense, and anxious for more than half of the previous month, compared to those without disabilities (data not shown).

Our data also show that smoking rates vary by type of disability. Individuals with chronic conditions, although more likely to have ever smoked, are not more likely to be current smokers. One probable explanation is that smoking contributed to occurrence of the chronic disease which in turn became an incentive to stop smoking.

Individuals with affective disorders—that is, emotional and psychiatric conditions—are twice as likely to be current smokers than individuals without disabilities, a finding consistent with a recent population based study of individuals with a broad range of mental illnesses.<sup>4</sup> The reason for the association of smoking with affective disorders is not clear. It has been suggested that nicotine is used as a form of self medication, that depression and nicotine dependence share common predisposing factors, and that smoking may also increase the risk of depression and certain anxiety disorders.<sup>4-6</sup>

Our data indicate that individuals with orthopaedic and sensory conditions are also more likely to be current smokers. Further research is needed to explore reasons for this association and to see if these and other findings from our sample hold up in a larger multi-state or national sample.

Smokers with disabilities also had different smoking profiles based on the severity of their disability. Smokers who



did not require assistance were more likely than those without disabilities to smoke daily, to smoke more cigarettes per day, and to smoke earlier upon waking—all factors associated with greater nicotine dependence. These findings have important implications for planning smoking cessation programmes because degree of nicotine dependence has been shown to be inversely associated with smoking cessation.<sup>19–21</sup> Individuals who required assistance were particularly more likely than those without disabilities to be current smokers. They were more likely to be planning to quit.

The recently published US Public Health Service report, “*A clinical practice guideline for treating tobacco use and dependence*”, promotes physician intervention as an effective strategy to increase long term smoking cessation.<sup>22</sup> Smokers with disabilities, regardless of the need for assistance, were more likely than those without disabilities to have been advised by a doctor to quit in the past 12 months, although we know nothing about the character or quality of the interaction. Smokers with disabilities who required assistance as well as smokers with chronic conditions were particularly more likely to have received medical advice to quit.

Although brief treatment such as physician advice to quit can increase smoking cessation rates, pharmacotherapies and more intensive tobacco dependence counselling, including practical counselling, social support as part of treatment, and social support arranged outside of treatment, are more effective.<sup>22</sup> However, it may be difficult for those with disabilities to participate in counselling or follow up sessions or to get social support without special accommodation. Telephone counselling and/or web based internet supports may be effective approaches which can be adapted to help adults with disabilities. Also, other medications may make pharmacotherapy treatment complex. Comprehensive physician intervention should be targeted to the distinct needs of individuals with disabilities.

Our findings should be interpreted in light of some important limitations. Firstly, some persons with severe limitations are not represented in this sample since institutionalised individuals are not included in the BRFSS, and BRFSS methodology precludes anyone assisting the selected respondent in completing the interview if the selected adult had difficulty in participating for any reason, such as a disability. Secondly, the BRFSS data are based on self report. By its nature, self reported data may be subject to bias. Respondents may over report socially acceptable behaviours and under report behaviours deemed unacceptable. They may also have difficulty remembering the frequency or time frame of events. Finally, the response rate to the BRFSS during 1996–1998 ranged from 54–59%. If the relation between smoking and disability status was different for people who did not respond to the survey, there could be a bias in our analysis.

These findings about disparities in smoking rates and patterns between adults with and without disabilities have relevance to health professionals who seek to address the health and wellbeing of adults with disabilities. Overall, our results strongly support the inclusion of those with disabilities in tobacco cessation and prevention efforts in state tobacco control programmes. These results suggest that outreach and cessation programmes may need to be different for subgroups within the disability community. Future studies are needed to understand patterns of smoking among individuals with disabilities as well as factors that would facilitate quitting.

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#### What this paper adds

Studies comparing smoking rates among individuals with specific disabilities to individuals without disabilities have shown that individuals with psychological or emotional disabilities have higher rates of smoking and no clear pattern among those with other disabilities. This study is the first to compare tobacco use among a population based sample of adults with a broad range of disabilities to adults without disabilities. It found that adults with disabilities are more likely to have ever smoked and to be current smokers, and that smoking rates varied with the type of disability.

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