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Short communication

Are smokers only using cigarettes? Exploring current polytobacco use among an adult population ☆

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Abstract

Background: The primary focus of tobacco prevention and cessation interventions has been on cigarette smoking. Polytobacco use (the concurrent use of cigarettes and one or more other tobacco product[s]), may present additional health risks and make cessation more difficult.

Methods: We determined population estimates of tobacco product use and of polytobacco use for more than 50 000 adults from 10 states. Logistic regression analyses were used to determine factors independently associated with polytobacco use among men only (due to low use among women).

Results: The overall adult prevalence was 22.4% for cigarettes and 3.4% for polytobacco use. Polytobacco use was more common among men who smoked cigarettes, with 26.0% using at least one other product, compared to 4.4% of women cigarette smokers. Polytobacco use among men was significantly associated with younger age, all races/ethnicities except Hispanic, less educational attainment, less income, and more-than-moderate alcohol use.

Conclusions: Prevention and cessation efforts need to target use of other forms of tobacco besides cigarettes, especially among younger men and men who are more-than-moderate drinkers of alcohol.

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Keywords: Tobacco smoking; Cigarette smoking; Polytobacco use; Smokeless tobacco

☆ The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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1. Background

Tobacco use continues to have a substantial adverse effect on the population's health in the United States (Centers for Disease Control and Prevention [CDC], 2003, 2005a; National Cancer Institute [NCI], 1998, 1992; U.S. Department of Health and Human Services [USDHHS], 2004). Although cigarettes remain the most commonly used tobacco product, many people use other forms of tobacco regularly. It is estimated that cigars, smokeless tobacco, pipes, and bidis account for an estimated \$7 billion in consumer expenditures annually (U.S. Department of Agriculture [USDA], 2006). All of these tobacco products are associated with important health consequences (American Society of Clinical Oncology, 2003; Henley, Thun, Chao, & Calle, 2004; NCI, 1998, 1992; Wu, Song, Ashley, & Watson, 2004).

In general, most research studies and public health surveillance reports have focused on characteristics of users for individual tobacco products (e.g., cigarettes, smokeless tobacco) rather than on the concurrent use of two or more tobacco products, or polytobacco use. Polytobacco use is important to examine because the adverse health effects may be additive, the combined use of different tobacco products could increase the risk of tobacco-attributable disease or death relative to the use of individual products only (Wetter et al., 2002), and there is an increased risk of nicotine exposure (Gilpin & Pierce, 2003) and possibly nicotine addiction. Individual or population-based cessation interventions may need to be modified to more effectively address the challenges and needs of polytobacco users.

A few studies have examined characteristics associated with concurrent tobacco product use among adults, specifically cigarettes and smokeless tobacco (Lando, Haddock, Klesgess, Talcott, & Jensen, 1999; Mumford, Levy, Gitchell, & Blackman, 2005; Wetter et al., 2002). Nationally, overall prevalence of concurrent use of cigarettes and smokeless tobacco among adults is an estimated 0.6–0.8% (Wetter et al., 2002), with prevalence much higher among men (Mumford et al., 2005; Wetter et al., 2002). Concurrent use of smokeless tobacco and cigarettes has also been found to be associated with lower educational achievement, less income, white race, living in nonmetropolitan areas, alcohol use, and high-risk behaviors among adults (Lando et al., 1999; Mumford et al., 2005; Wetter et al., 2002). Additionally, there may be differences when comparing concurrent users of cigarettes and smokeless tobacco with cigarette-only users or smokeless tobacco-only users. For example, Mumford et al. (2005) found that among men who smoked cigarettes, concurrent users were more likely to be white, to live in nonmetropolitan areas, and have lower educational attainment than men who only smoked cigarettes. At this time, no published studies were found that examined characteristics of adults who use cigarettes in combination with other tobacco products.

We defined polytobacco use as cigarette use in combination with other tobacco product use (i.e., cigar, smokeless, pipe, and/or bidi), since users of other tobacco products are likely to also use cigarettes (Delnevo, Pevzner, Hrywna, & Lewis, 2004; Nelson, Davis, Chrismon, & Giovino, 1996; Rigotti, Lee, & Wechsler, 2000; Wetter et al., 2002). To our knowledge, prevalence and characteristics associated with cigarette use in combination with use of any of these tobacco products has not been examined.

We analyzed detailed tobacco use data available from 10 states from the Behavioral Risk Factor Surveillance System (BRFSS), to address two main purposes. First, we examined the prevalence of polytobacco use among adult smokers. Second, we used logistic regression modeling to identify the factors associated with polytobacco use.

2. Methods

Data were obtained from the 2003 BRFSS. The BRFSS is an ongoing, state-based, random-digit-dialed telephone survey that collects self-reported behavioral and health information from a representative sample of the civilian, noninstitutionalized, U.S. population aged ≥ 18 years. Details of this system are provided elsewhere (CDC, 2005b). Analyses were limited to the 10 states (Arkansas, Colorado, Delaware, Indiana, Nebraska, New Jersey, North Carolina, North Dakota, Texas, and Wyoming) that included an optional module of questions on tobacco products. A total of 56 099 respondents in these states completed the surveys. The median CASRO (Council of American Survey Research Organization) response rate for the 10 states was 58.0% (range: 34.4%–64.6%).

To determine cigarette use status, respondents were asked about smoking 100 or more cigarettes in their lifetime (ever use), with current use defined as currently smoking cigarettes every day or some days among ever smokers (CDC, 2005c). To assess current use of cigar, smokeless tobacco, pipes, and bidis, respondents were asked a question about ever use of each product individually, with a follow-up question for ever users about current use, defined for each product as use every day or some days. Poly tobacco use, as mentioned previously, was defined as being a current cigarette smoker and being a current user of one or more other tobacco products. We chose to explore poly tobacco this way due to the high prevalence of cigarette use and an interest in determining what proportion of cigarette smokers were also using other tobacco products.

3. Analyses

Data were combined for all 10 states, and all analyses were conducted using SAS, Version 8-2 (SAS Institute Inc, Cary, NC) and SUDAAN, Version 9 (Research Triangle Institute, Research Triangle Park, NC). We calculated overall and demographic-specific estimates for the prevalence of each specific product among the whole population and for poly tobacco use among current smokers. The demographic categories included gender, age (18–29, 30–44, 45+), race/ethnicity (white, black, other [which included Asians, Native Hawaiians, Other Pacific Islanders, American Indians, Alaskan Natives, or Multiracial adults], Hispanic), and household income level ($\leq \$19\,999$, $\$20\,000$ – $\$49\,999$, $\geq \$50\,000$). Because previous studies suggested that heavier alcohol use was associated with use of multiple tobacco products, we also analyzed data by alcohol consumption, (i.e., “more-than-moderate use” among men and women was >2 drinks per day and >1 drink per day, respectively, and “moderate use or less” for men and women was ≤ 2 drinks per day and ≤ 1 drink per day, respectively [USDHHS & USDA, 2005]). Bivariate analyses were used to identify demographic and drinking characteristics that were associated with each specific product (compared to nonuse of that specific product) and with poly tobacco use among current smokers (compared to nonuse of any tobacco product).

To determine whether the demographic factors or alcohol use were still associated with poly tobacco use after adjusting for other variables, we conducted multivariate modeling to calculate odds ratios. Because preliminary analyses indicated very low use of other tobacco products among women, multivariate analyses were restricted to men.

4. Results

4.1. Cigarette, cigar, smokeless tobacco, pipe, and bidi use

Among the 10 states, the overall adult prevalence for each tobacco product was 22.4% for cigarettes, 5.7% for cigars, 3.5% for smokeless tobacco, 0.9% for pipes, and 0.3% for bidis (Table 1). Men and

Table 1
Prevalence and characteristics associated with current tobacco product use among adults and current polytobacco product use among adult smokers in 10 states, BRFSS 2003

	All adults										Adult smokers	
	Cigarette		Cigar		Smokeless tobacco		Pipe		Bidi		Polytobacco	
	%	OR ^a , CI (95%)	%	OR ^a , CI (95%)	%	OR ^a , CI (95%)	%	OR ^a , CI (95%)	%	OR ^a , CI (95%)	%	OR ^b , CI (95%)
All	22.4	–	5.7	–	3.5	–	0.9	–	0.3	–	16.3	–
Gender												
Male	25.5	1.4 (1.3–1.5)	10.4	9.5 (7.8–11.5)	6.8	20.9 (16.3–26.7)	1.8	28.8 (10.7–77.8)	0.5	4.4 (2.1–8.9)	26.0	9.6 (7.6–12.1)
Female	19.4	Referent	1.2	Referent	0.3	Referent	0.1	Referent	0.1	Referent	4.4	Referent
Age												
18–29	27.1	1.6 (1.5–1.8)	8.5	2.3 (1.9–2.7)	4.4	1.9 (1.5–2.4)	1.0	1.0 (0.6–1.6)	1.1	54.7 (23.1–129.5)	22.6	3.3 (2.6–4.1)
30–44	24.6	1.4 (1.3–1.5)	6.5	1.7 (1.5–2.0)	4.5	2.0 (1.6–2.4)	0.7	0.7 (0.5–0.9)	0.2	10.5 (4.3–25.5)	17.2	2.2 (1.8–2.7)
45+	18.7	Referent	3.9	Referent	2.4	Referent	1.0	Referent	0.0	Referent	11.4	Referent
Race/ethnicity												
White	22.9	1.3 (1.1–1.4)	6.0	1.4 (1.1–1.8)	4.1	2.6 (1.7–4.1)	1.0	1.7 (0.8–3.8)	0.1	0.2 (0.1–0.6)	16.8	1.6 (1.1–2.2)
Black	22.7	1.3 (1.1–1.5)	4.6	1.0 (0.7–1.5)	1.4	0.9 (0.5–1.6)	0.5	0.8 (0.3–2.0)	0.9	1.3 (0.5–3.8)	13.0	1.1 (0.7–1.8)
Other	26.2	1.5 (1.2–1.9)	6.9	1.6 (1.1–2.4)	4.2	2.7 (1.5–4.8)	1.1	1.7 (0.7–4.4)	0.7	1.1 (0.3–4.1)	19.2	2.1 (1.3–3.5)
Hispanic	19.0	Referent	4.4	Referent	1.6	Referent	0.6	Referent	0.7	Referent	13.8	Referent
Education												
≤12 grade	28.4	1.8 (1.7–2.0)	5.4	0.9 (0.8–1.0)	4.0	1.3 (1.1–1.5)	0.9	1.0 (0.7–1.4)	0.4	1.5 (0.7–3.2)	16.1	1.8 (1.5–2.2)
>12 grade	17.7	Referent	6.0	Referent	3.1	Referent	0.9	Referent	0.3	Referent	16.6	Referent
Income												
≤\$19999	28.6	2.0 (1.8–2.2)	4.5	0.6 (0.5–0.7)	3.0	0.8 (0.6–1.1)	0.9	0.8 (0.5–1.2)	0.2	1.5 (0.4–5.9)	13.8	1.5 (1.2–2.0)
\$20–49999	26.4	1.8 (1.6–1.9)	5.2	0.7 (0.6–0.8)	3.8	1.0 (0.8–1.2)	0.8	0.7 (0.5–1.0)	0.5	3.3 (0.9–11.9)	15.8	1.5 (1.2–1.9)
≥\$50000	16.8	Referent	7.5	Referent	3.7	Referent	1.2	Referent	0.1	Referent	18.1	Referent
Alcohol use												
More-than-moderate use	51.9	4.2 (3.6–4.8)	13.2	2.7 (2.1–3.4)	8.5	2.8 (2.1–3.8)	2.6	3.2 (1.7–6.0)	1.3	5.1 (1.8–14.4)	22.2	7.0 (5.2–9.4)
Moderate use or less	20.5	Referent	5.3	Referent	3.2	Referent	0.8	Referent	0.3	Referent	15.6	Referent
Smoking status												
Current	–	–	12.3	4.3 (3.7–5.0)	4.0	1.4 (1.1–1.7)	2.0	4.4 (3.1–6.5)	0.9	5.3 (2.2–12.8)	–	–
Former	–	–	5.2	1.7 (1.4–2.0)	4.2	1.5 (1.2–1.8)	0.9	2.1 (1.4–3.1)	0.1	0.7 (0.2–2.5)	–	–
Non smoker	–	–	3.2	Referent	2.9	Referent	0.5	Referent	0.2	Referent	–	–

BRFSS: Behavioral Risk Factor Surveillance System; OR: odds ratio; CI: confidence interval.

^a Cigarette, cigar, smokeless tobacco, pipe, and bidi use as compared to respective nonuse of product (i.e.: cigarette use compared to non-cigarette use).

^b Polytobacco use as compared to nonuse of any tobacco product.

younger adults were significantly more likely to use all tobacco products (except pipes among younger adults) (Table 1). Prevalence of cigarette and smokeless tobacco use was also higher among those with less educational attainment, and cigarette use was higher in households with less income (Table 1). Finally, use of every tobacco product was significantly associated with more-than-moderate alcohol use, and current cigarette smokers were more likely than nonsmokers to use cigars, smokeless tobacco, pipes, and bidis (Table 1).

4.2. Polytabacco use

Among all adults, the prevalence of polytabacco use was 3.4% (*data not shown*). Among men who smoked cigarettes, 26.0% were polytabacco users, compared with only 4.4% of women cigarette smokers (Table 1). In stratified analyses, polytabacco use was more common among men, younger adults, whites, races/ethnicities other than white, black, or Hispanic, people with lower levels of educational attainment and income, and more-than-moderate alcohol users (greater alcohol use) (Table 1). Multivariate analyses demonstrated that polytabacco use among men was most strongly associated with age 18–29 years; race/ethnicity other than white, black, or Hispanic; ≤ 12 th grade education, household income $\leq \$19999$, and greater alcohol use (Table 2).

Table 2
Characteristics associated with current cigarette only use, current polytabacco product use among adult men in 10 states, BRFSS 2003

	Cigarettes only		Polytabacco use	
	OR ^a	CI (95%)	OR ^a	CI (95%)
Age				
18–29	1.2	(1.0–1.5)	3.1	(2.3–4.1)
30–44	1.4	(1.2–1.6)	2.7	(2.1–3.5)
45+	1.0	Referent	1.0	Referent
Race/ethnicity				
White	1.5	(1.2–1.9)	3.6	(2.2–5.6)
Black	1.4	(1.0–1.8)	2.2	(1.2–3.9)
Other	1.8	(1.2–2.5)	3.7	(1.9–7.1)
Hispanic	1.0	Referent	1.0	Referent
Education				
≤ 12 grade	1.9	(1.6–2.1)	2.2	(1.7–2.8)
> 12 grade	1.0	Referent	1.0	Referent
Income				
$\leq \$19999$	2.0	(1.6–2.5)	1.7	(1.2–2.5)
$\$20–49999$	1.8	(1.5–2.0)	1.4	(1.1–1.9)
$\geq \$50000$	1.0	Referent	1.0	Referent
Alcohol use				
More-than-moderate use	4.1	(3.2–5.3)	5.6	(3.8–8.3)
Moderate use or less	1.0	Referent	1.0	Referent

BRFSS: Behavioral Risk Factor Surveillance System; OR: odds ratio; CI: confidence interval.

^a Cigarettes only, Polytabacco use as compared to nonuse of any tobacco product.

5. Discussion

Among men who smoked cigarettes, one out of four used at least one other tobacco product. The high prevalence of current polytobacco use among male cigarette smokers should be a focus for at least two reasons. First, most tobacco control interventions are primarily designed to address cigarette smoking and do not address combined use of additional tobacco products ([Task Force on Community Preventive Services, 2001](#)). Second, due to legislative, environmental, and marketing factors, the use of other non-cigarette tobacco products (i.e. smokeless tobacco) could increase. Possible reasons why this could occur include higher excise taxes on cigarettes, the increasing number of smoke-free policies being instituted in local communities and at the state level, and industry marketing and advertising for other tobacco products ([Delnevo, Hrywna, Foulds, & Steinberg, 2004](#); [Henningfield, Rose, & Giovino, 2002](#); [Ohsfeldt, Boyle, & Capilouto, 1997](#)). For example, smokeless tobacco company advertisements have encouraged the use of smokeless tobacco in situations when people cannot smoke cigarettes ([Henningfield et al., 2002](#)). A recent study found cigarette smokers with a home ban on smoking were more likely to use smokeless tobacco to maintain their nicotine addiction ([Mumford et al., 2005](#)). The industry also proposes smokeless tobacco as a healthier alternative to smoking ([Hatsukami, Lemmonds, & Tomar, 2004](#)), this is important to monitor because some researchers have found that using smokeless tobacco may actually lead to initiation of smoking ([Haddock et al., 2001](#); [Tomar, 2002](#)).

In these 10 states, the prevalence of use for each of the specific tobacco products was generally similar to national estimates (2000 National Health Interview Survey [NHIS], public use data file). Polytobacco use was high among male cigarette smokers, but low among all adults. Of note is that population-based estimates in this study and elsewhere confirm that bidi and pipe use is rare among adults ([Nelson et al., 1996](#); [Tomar, 2003](#); 2000 NHIS, public use data file). Men, younger adults, more-than-moderate alcohol consumers, and current cigarette smokers were more likely to use non-cigarette tobacco products. These results are consistent with the literature that has found the use of non-cigarette tobacco products associated with men ([Delnevo, Pevzner et al., 2004](#); [Gilpin & Pierce, 2001](#); [Rigotti et al., 2000](#); [Sanchez, 2001](#)), cigarette use ([Delnevo, Pevzner et al., 2004](#); [Gilpin & Pierce, 2001](#); [Rigotti et al., 2000](#); [Sanchez, 2001](#)), and younger age ([Tomar, 2002](#); [Delnevo, Pevzner et al., 2004](#); [Sanchez, 2001](#)). We found younger adults were more likely to use most tobacco products. High school adolescents have reported high use of cigarettes, cigars, and smokeless tobacco in national surveys ([CDC, 2004b](#)); use may continue into young adulthood ([Rigotti et al., 2000](#)).

Polytobacco product use among men was associated with younger age; all races/ethnicities except Hispanic; less educational attainment, less household income, and greater alcohol use. Our findings are similar to prior studies examining demographic and alcohol use characteristics among adults who use cigarettes and smokeless tobacco ([Lando et al., 1999](#); [Mumford et al., 2005](#); [Wetter et al., 2002](#)).

It is not clear from our study why individuals used multiple tobacco products and alcohol. Some clues may be found in the literature, which cites risk-taking, sensation-seeking, and other psychosocial issues as possible reasons young adults use tobacco products and alcohol. Young adults who engage in risky behaviors such as using marijuana and having many sexual partners are more likely to use multiple tobacco products and alcohol ([Rigotti et al., 2000](#)). Multiple drug use creates an enhanced effect for users, and allows for substitution of one product for another when a particular substance isn't available ([Griffith, Pederson, & Kuiper, submitted for publication](#)). Young adults may also be more likely to use tobacco and alcohol as a part of a college lifestyle where social life may be valued more highly than other components of college (i.e., athletic participation, educational achievement, or religion) ([Rigotti et al., 2000](#)).

These results are subject to limitations. Data were collected from the 10 states that chose to include the tobacco product module on their surveys and may not be generalizable to other states. Estimates are also based on self-reports and not validated by biochemical markers, which could underestimate actual use. However, self-reported data on cigarette smoking and smokeless tobacco have been found to be valid in other surveys (Caraballo, Giovino, & Pechacek, 2004; Caraballo, Giovino, Pechacek, & Mowery, 2001; Holiday, McLarty, Yanigihara, Riley, & Shepherd, 1995). Finally, other tobacco product use questions and definitions differ slightly between the BRFSS and the NHIS, limiting the ability to make true comparisons (i.e. the NHIS contains an additional question for each specific product on having used or smoked the product at least 20–50 times, which is used to define current use).

All tobacco products are associated with adverse health consequences and no tobacco product use is safe (American Society of Clinical Oncology, 2003; Deckers, Farley, & Heath, 2006; NCI, 1998, 1992). Along with these health concerns, several questions about polytobacco use remain. Are polytobacco users less likely than single-product users to quit smoking? Are they more nicotine-dependent? How or why do they become polytobacco users? Answers to these questions are needed for the design of effective interventions which address polytobacco use. Given the fact that younger men tend to be polytobacco users, programs targeting this population, e.g., in worksites or on college campuses, may be needed. Some strategies that might be effective for reducing use of all tobacco products include raising rates of taxes on all tobacco products (Campaign for Tobacco-Free Kids, 2003; Delnevo, Hrywna et al., 2004; Ohsfeldt & Boyle, 1994; Ohsfeldt et al., 1997; USDHHS, 2000), reducing access to tobacco products by minors (CDC, 1999), targeting tobacco control media and ad campaigns to users of other tobacco products such as smokeless tobacco (Task Force on Community Preventive Services, 2001), and including polytobacco use in telephone quit line counseling (CDC, 2004a).

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