

BMJ Open Polytobacco use and multiple-product smoking among a random community sample of African-American adults

Irma Corral,¹ Hope Landrine,² Denise Adams Simms,³ Jukelia J Bess²

To cite: Corral I, Landrine H, Simms DA, *et al.* Polytoabacco use and multiple-product smoking among a random community sample of African-American adults. *BMJ Open* 2013;**3**:e003606. doi:10.1136/bmjopen-2013-003606

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2013-003606>).

Received 16 July 2013
Revised 31 October 2013
Accepted 1 November 2013



CrossMark

¹Department of Psychiatric Medicine, Brody School of Medicine, East Carolina University, Greenville, North Carolina, USA

²Center for Health Disparities, East Carolina University, Greenville, North Carolina, USA

³California Black Health Network, San Diego, California, USA

Correspondence to
Dr Hope Landrine;
landrineh@ecu.edu

ABSTRACT

Objectives: Little is known about polytoabacco use among African-American adults. This study is the first to explore this among a random, statewide, community sample of African-American adults.

Setting: Community-based sampling obtained a random, household-probability sample of African-American adults from California, surveyed door to door in randomly selected census tracts statewide.

Participants: Participants were a statewide, random-household sample of N=2118 African-American adults from California who completed a survey on past 30-day smoking of cigarettes, blunts, bidis, kreteks, cigarillos, marijuana and cigars.

Results: Almost half (49.3%) of the African-American cigarette-smokers and 14.9% of the cigarette non-smokers had smoked at least one non-cigarette product in the past 30 days. Smokers had a substantial prevalence of smoking cigarillos (28.7%) and blunts (27.7%). Logistic regressions revealed that the odds of smoking most of the non-cigarette products were higher for cigarette smokers and men, inversely related to age, and unrelated to socioeconomic status. However, smoking of blunts, bidis and kreteks was not predicted by cigarette smoking.

Conclusions: Smoking of cigarillos (eg, *Phillies, Black & Mild*) and blunts may be prevalent among African-American cigarette-smokers and non-smokers alike, but such products are not examined in most population-level smoking research. Smoking of these products should be included in surveillance studies, in cancer prevention programmes and in healthcare provider-assessment of smoking, and addressed in smoking cessation programmes as well.

INTRODUCTION

Polytoabacco use refers to the use of cigarettes in combination with another tobacco or smoked product such as cigars, kreteks (clove cigarettes), bidis (hand-rolled, flavoured tobacco wrapped in temburi or tendu leaves) and pipes.^{1–4} Compared to cigarette smoking, polytoabacco use is associated with higher nicotine addiction, greater difficulty quitting tobacco and increased incidence of smoking-related cancers.^{1–5} These three

Strengths and limitations of this study

- A large random sample and high survey response rate.
- A sample from California whose results may not generalise elsewhere.
- Use of self-reports that may underestimate tobacco use.

outcomes are more prevalent among black than white smokers,^{5–7} even though African-Americans smoke significantly fewer cigarettes per day and initiate smoking later in life.^{5–7} Possible polytoabacco use among African-Americans might be relevant to these puzzling tobacco-related racial disparities, and hence assessment of polytoabacco use among African-American smokers is needed.

Population surveillance studies reveal that polytoabacco use among adults is low, that is, 2.5% overall, 2.6% for white people, 2.9% for African-Americans.¹ However, most population studies of adults,^{1–3} unlike those of teens,^{4–8} did not assess smoking of bidis and kreteks. These products have 3–5 times higher nicotine, tar and carbon monoxide than conventional US cigarettes,^{9–10} and the incidence of smoking-related cancers is up to 112% higher among bidi-smokers than among cigarette-smokers.^{11–12} The sole study of bidi smoking among a large, random sample of adults (ie, 18–24 year olds in the Behavioral Risk Factor Surveillance System) found that 25.4% of African-Americans had ever smoked bidis, a rate that was three times higher than that of white people.¹³ Likewise, a study of polytoabacco use among military recruits found significantly higher use of bidis (but not of kreteks) among African-Americans than white people.¹⁴

In addition to limited population data on African-American adult smoking of highly carcinogenic products such as bidis, population studies usually do not assess smoking of the products that are popular in the African-

American community among cigarette-smokers and non-smokers alike. Foremost among these are the thin, flavoured little cigars (ie, cigarillos^{15–17}), such as *Philly* and *Black & Mild* that African-Americans often do not categorise as cigars,¹⁸ and blunts.¹⁵ The term blunts refers to two different products: Inexpensive, moderate-sized cigars (larger than cigarillos but smaller than standard-sized cigars) that are wrapped in a single tobacco leaf and burn as fast as cigarettes, and moderate-sized cigars emptied of their tobacco, filled with marijuana and wrapped in a single tobacco leaf. Hence, irrespective of how the term is defined, blunts are tobacco products and have been analysed in tobacco studies.^{8 15–17} Such studies found prevalence rates of up to 30% for both products among young African-American adults.^{8 15–17}

Thus, little is known about African-American adult smoking of a variety of non-cigarette products. This study reports the first data on the prevalence and correlates of smoking blunts, cigarillos (*Philly/Black & Mild* by brand name), bidis, kreteks, standard-sized cigars and marijuana among a random, statewide, community sample of African-American adult smokers (*polytobacco use*) and non-smokers (*multiple product smoking*). Marijuana is not a tobacco product; it does not contain nicotine, and hence is generally excluded from studies of smoking. However, marijuana smoke contains many of the same carcinogens as cigarettes and is associated with increased cancer risk; hence, marijuana smoking may be relevant to understanding persistent, unexplained smoking-related cancer disparities among African-Americans.¹⁵

METHOD

Procedures

Participation in telephone and household interview health surveys is low among African-Americans (eg, 0.2–20%^{19–21}); hence, community-based sampling (CBS) and community-based participatory research (CBPR) approaches were used to increase participation rates.^{22–24} CBS is a three-stage, random-household probability sampling procedure often used in population studies of minorities to assure inclusion of segregated, linguistically isolated and phoneless/cell phone only households; hence, CBS yields more representative ethnic minority samples.^{23 24} In CBS stage 1, census data were used to identify the counties in which the majority of Californian African-Americans reside. This revealed that most (90%) of the Californian African-American population resides in seven counties, for example, Los Angeles (42%), Sacramento (10%), San Diego (6%). African-Americans were sampled from these counties proportional to representation, that is, 42% of the sample came from Los Angeles county and 6% from San Diego county (etc), such that this sample matched the distribution of the Californian African-American population. This was achieved by sampling more or fewer census tracts in each county as needed.²⁴

In CBS stage 2, 513 census tracts (CTS) within the seven counties were randomly selected. In stage 3, a

smaller set of equal numbers of low-segregated (20–50% of African-Americans) and high-segregated (60–92% of African-Americans) CTS were randomly selected from the 513 tracts, and block groups within those randomly selected. Every household in the block groups was sampled door to door on weekends 2006–2008, with one adult participant permitted per household. The door to door method assured inclusion of phoneless/cell phone only households. Further details on the method are provided elsewhere.²⁴ Because cigarette-smoking rates are significantly higher among phoneless/cell phone only households,¹⁹ their inclusion here via the door to door survey method is likely to yield higher smoking rates than are found in random telephone surveys.

The CBPR aspect of the study was cosponsorship by the California Black Health Network (CBHN), a well-known, trusted organisation that has conducted statewide tobacco assessment and tobacco-control programmes for Californian African-Americans since the 1970s. CBHN needed a statewide health assessment to improve its programmes and so cosponsored the study. CBHN staff (African-American adult surveyors) in each county collected the data in their counties. Surveyors wore CBHN ID badges, approached all households in the block groups, introduced themselves as CBHN staff and stated that the purpose of the survey was to acquire data needed to improve CBHN programmes in each black community. Surveyors handed potential participants an Informed Consent Letter that described the survey, stated the study purpose and included CBHN phone numbers (in each county) to call. Surveyors then asked if a black adult who resided in the household might wish to complete the anonymous *California Black Health Network* health survey for \$10 cash. Using these CBPR approaches, the response rate was 99%—that is, of those who answered the door, 99% completed and only 1% refused the survey.²⁴

Because up to 68% of cotinine-determined African-American smokers deny smoking (self-report non-smoking) in household interviews,²⁵ a written survey was used instead. Anonymous written surveys decrease socially desirable denial of smoking and substance use and yield higher smoking and substance use prevalence rates²⁶; hence, higher smoking rates are expected here than are found in random household surveys. Surveys were left with participants to complete in private and retrieved 30 minutes later. The study had the approval of the Institutional Review Board of San Diego State University.

Materials/measures

The survey assessed the health behaviours on which CBHN desired data (diet, physical activity, sun safety, smoking of a variety of products); only the smoking data are presented here. We explored past 30 day smoking (yes/no) of cigarettes, blunts, bidis, kreteks/clove cigarettes, two cigarillos by brand name (*Philly, Black & Mild*), standard-sized cigars and marijuana. Type of cigarettes smoked (menthol, non-menthol, both) and demographic variables were also assessed. The survey took 15–30 minutes.

Table 1 Prevalence of smoking non-cigarette products among a random sample of African-American adult cigarette smokers and non-smokers

Past 30-day smoking of	Overall %	Smokers† %	Non-smokers‡ %	$\chi^2_1^*$
Philly; Black & Mild	13.0	28.7	5.3	176.389
Blunts	14.1	27.7	7.5	23.255
Standard-sized cigars	10.1	21.4	4.5	107.004
Marijuana	18.6	33.0	11.4	113.856
Bidis	2.0	5.0	0.5	35.97
Kreteks/cloves	1.1	2.7	0.4	17.304
Any one or more of the above	26.1	49.3	14.9	257.73
Men any one or more of the above	33.6	57.3	19.5	114.803
Women any one or more of the above	20.6	40.6	12.1	107.047

*p=0.0005.

†n=690 (32.6%).

‡n=1284 (67.3%).

RESULTS

Participants were a random, statewide sample of N=2118, US-born, self-identified African-American adult residents of California, 1214 women (57.3%) and 904 men (42.7%), whose ages ranged from 18 to 95 years (mean=43.8, SD=16.2 years). Details of their demographics have been presented elsewhere,²⁴ and revealed that this 2006–2008 sample is similar to the 2006–2008 black

population in the California Census. The prevalence of cigarette smoking among this sample was 32.6%, and was significantly higher among men (37.2%) than women (29.7%; $\chi^2=10.651$, $p<0.001$).

Table 1 displays past 30-day smoking prevalence rates for six non-cigarette products among cigarette smokers and non-smokers. As shown, the prevalence of smoking one or more non-cigarette products was 49.3% for cigarette

Table 2 Logistic regression predicting African-American adult smoking of non-cigarette products

Model and variables entered	B	Wald	p Value	OR	95% CI
<i>Step 1: Demographic variables</i>					
Age (years)					
45 and older (REF)					
18–24	1.997	38.442	0.0005	7.37	3.919 to 13.856
25–34	1.05	17.546	0.0005	2.85	1.46 to 4.656
35–44	0.705	7.882	0.005	2.02	1.237 to 3.311
Gender					
Women (REF)					
Men	0.931	22.023	0.0005	2.54	1.720 to 3.742
Education					
Did not finish high school (REF)					
High school graduate/GED	0.051	0.022	0.882		
College and higher	−0.227	1.078	0.299		
Income					
Less than \$10 999 (REF)					
\$11 000–\$25 999	0.330	1.156	0.282		
\$26 000–\$49 999	0.524	3.445	0.063		
\$50 000 and higher	−0.189	0.437	0.508		
Employment					
Employed (REF)					
Unemployed	0.075	0.109	0.741		
<i>Step 2: Cigarette smoking</i>					
Smoking					
Non-smoker (REF)					
Smoker	1.16	21.760	0.0005	3.19	1.962 to 5.212
Cigarette type					
Non-Menthol (REF)					
Menthol	0.447	3.469	0.063		
Both	0.851	7.166	0.007	2.34	1.256 to 4.366

REF, reference group.

smokers and 14.9% for non-smokers. Among African-American men, the prevalence of smoking one or more non-cigarette products was 57.3% for smokers and 19.5% for non-smokers; among women, these rates were 40.6% (cigarette smokers) and 12.1% (non-smokers).

Table 2 displays the hierarchical logistic regression predicting smoking of any non-cigarette product from demographic and cigarette-smoking variables. As shown, smoking non-cigarette products was predicted by age, gender and cigarette smoking but not by socioeconomic status (SES; education, income, employment). Men (OR=2.5), cigarette smokers (OR=3.2) and young adults (OR=7.4) were more likely to smoke non-cigarette products, and the odds of smoking the products increased with decreasing age.

Table 3 displays separate regressions predicting smoking of blunts and of the cigarillos *Philly/Black & Mild*. Age, gender and higher incomes were predictors of smoking blunts. The odds of smoking blunts were 2.5 times higher for men, and increased as age decreased, with young (ages 18–24) adults being 6.3 times more likely than older ones (ages 45 and older) to smoke

blunts. *Philly/Black & Mild* smoking was predicted by age, gender and cigarette smoking. Men were 2.6 times more likely than women, young adults 15.9 times more likely than older ones and cigarette smokers 5.3 times more likely than non-smokers to smoke *Philly/Black and Mild*.

The separate regressions predicting cigar-smoking and marijuana-smoking (table 4) found age, gender and cigarette smoking to be predictors of both. Men, young adults and smokers were 2.5–3 times more likely to smoke standard-sized cigars than their reference groups. For marijuana-smoking, men were twice as likely, the youngest age group six times more likely, and smokers 2.5 times more likely than their reference groups to smoke marijuana. A similar regression predicting bidi-smoking (table 5) revealed that age was the sole predictor, with those aged 18–24 (OR=4.7) and 35–44 (OR 4.4) years old being more likely to smoke bidis than the older age group. The regression predicting smoking kreteks/cloves (table 5) revealed that age and smoking menthol cigarettes were the predictors; those aged 35–44 were 11 times more likely, and menthol smokers (OR=0.205) were less likely to smoke kreteks/cloves.

Table 3 Logistic regressions predicting African-American adult smoking of Blunts and of Philly/Black & Mild cigarillos

Variables entered	Blunts				Philly/Black & Mild cigarillos			
	Wald	p Value	OR	95% CI	Wald	p Value	OR	95% CI
<i>Step 1: Demographics</i>								
Age (years)								
45 and older (REF)								
18–24	29.69	0.0005	6.25	3.23 to 12.08	51.69	0.0005	15.90	7.48 to 33.81
25–34	13.31	0.0005	3.07	1.68 to 5.62	21.33	0.0005	4.23	2.29 to 7.80
35–44	7.208	0.007	2.38	1.26 to 4.48	14.22	0.0005	3.38	1.79 to 6.36
Gender								
Women (REF)								
Men	14.10	0.0005	2.49	1.55 to 4.02	14.02	0.0005	2.57	1.57 to 4.21
Education								
Not high school graduate (REF)								
High school graduate/GED	0.82	0.365			0.928	0.335		
College and higher	1.066	0.302			0.616	0.433		
Income								
Less than \$10 999 (REF)								
\$11 000–\$25 999	3.925	0.048	2.17	1.01 to 4.66	0.375	0.540		
\$26 000–\$49 999	4.792	0.029	2.18	1.09 to 4.37	0.289	0.591		
\$50 000 and higher	0.051	0.821			0.089	0.766		
Employment								
Employed (REF)								
Unemployed	0.259	0.611			1.29	0.257		
<i>Step 2: Cigarette smoking</i>								
Smoking								
Non-smoker (REF)								
Smoker	3.767	0.052	1.89	0.994 to 3.59*	19.75	0.0005	5.34	2.55 to 11.18
Type								
Non-menthol (REF)								
Menthol	0.521	0.470			6.72	0.013	2.36	1.19 to 4.66
Both	0.169	0.681			15.42	0.005	5.08	2.26 to 11.43

*Not significant.

REF, reference group.

Table 4 Logistic regressions predicting African-American adult smoking of cigars and of marijuana

Variables entered	Standard-sized cigars				Marijuana			
	Wald	p Value	OR	95% CI	Wald	p Value	OR	95% CI
<i>Step 1: Demographics</i>								
Age (years)								
45 and older (REF)								
18–24	9.023	0.003	2.99	1.46 to 6.09	30.68	0.0005	6.05	3.20 to 11.45
25–34	0.819	0.365			25.30	0.0005	4.13	2.38 to 7.17
35–44	4.132	0.042	1.98	1.03 to 3.82	6.85	0.009	2.18	1.22 to 3.90
Gender								
Women (REF)								
Men	16.823	0.0005	3.08	1.80 to 5.28	11.51	0.001	2.14	1.38 to 3.32
Education								
Not high school graduate (REF)								
High school graduate/GED	0.264	0.607			1.03	0.310		
College and higher	0.004	0.947			0.129	0.719		
Income								
Less than \$10 999 (REF)								
\$11 000–\$25 999	0.518	0.472			1.35	0.245		
\$26 000–\$49 999	2.065	0.151			2.14	0.143		
\$50 000 and higher	0.473	0.492			0.048	0.826		
Employment								
Employed (REF)								
Unemployed	0.032	0.858			1.08	0.300		
<i>Step 2: Cigarette smoking</i>								
Smoking								
Non-smoker (REF)								
Smoker	6.305	0.012	2.54	1.23 to 5.26	9.42	0.002	2.55	1.40 to 4.64
Type								
Non-menthol (REF)								
Menthol	0.162	0.687			3.83	0.050	1.76	0.999 to 3.09*
Both	1.887	0.170			2.74	0.098		

REF, reference group.

*Not Significant.

DISCUSSION

There was a high (49.3%) prevalence of polytobacco use among African-American adult cigarette smokers that held for men (57.3%) and women (40.6%). Substantial smoking of non-cigarette products was also found among non-cigarette smokers, with 19.5% of men and 12.1% of women non-smokers smoking at least one non-cigarette product in the past 30 days. The odds of smoking most non-cigarette products were generally higher for men than women (ORs=2.5 to 3.0), and for cigarette smokers than non-smokers (ORs=3.2 to 5.3); however, gender did not contribute to smoking bidis or kreteks, and cigarette smoking did not contribute to smoking bidis, kreteks or blunts. Smoking of any non-cigarette product and of each specific product was generally highest among adults aged 18–24 years (ORs=3 to 15.9) as in prior studies,^{13–16} and decreased as age increased. The exception was smoking kreteks/cloves; for these, older adults were more likely to be users. Moreover, unlike the well-known relationship between cigarette smoking and low SES,^{1 3–5} for these non-cigarette products, SES was related only to smoking blunts, with higher incomes a predictor. The type of

cigarette smoked contributed to smoking non-cigarette products in general, and to smoking *Phillies/Blacks* specifically, with higher odds for those who smoked menthol and non-menthol cigarettes, rather than one or the other; menthol smoking generally did not predict the use of other products.

These findings suggest a problematically high prevalence of polytobacco use among African-American smokers that is strongly associated with gender and young adulthood but not associated with low income, low education or menthol smoking. Polytobacco users were mostly young men of varied SES who smoked all types of cigarettes along with non-cigarette products—that is, a possible pattern of smoking whatever was available. Given that low SES was not a risk factor for this, polytobacco use might perhaps instead be related to the social risk factors for cigarette smoking among African-Americans that have been identified in prior studies—that is, racial segregation^{27–29} and racial discrimination.^{30–32} High levels of residential segregation (with high exposure to targeted tobacco advertising and easy access to single cigarettes in black neighbourhoods), and high levels of (the stress of) racial discrimination

Table 5 Logistic regressions predicting African-American adult smoking of bidis and of kreteks/cloves

Variables entered	Bidis				Kreteks/clove cigarettes			
	Wald	p Value	OR	95% CI	Wald	p Value	OR	95% CI
<i>Step 1: Demographics</i>								
Age (years)								
45 and older (REF)								
18–24	4.634	0.031	4.74	1.15 to 19.55	0.000	0.997		
25–34	3.256	0.071			3.540	0.06	5.79	0.929 to 36.04*
35–44	5.000	0.025	4.43	1.20 to 16.32	7.265	0.007	11.09	1.928 to 63.79
Gender								
Women (REF)								
Men	1.970	0.160			0.179	0.672		
Education								
Not high school graduate (REF)								
High school graduate/GED	0.000	0.990			0.033	0.855		
College and higher	0.013	0.910			1.447	0.229		
Income								
Less than \$10 999 (REF)								
\$11 000–\$25 999	1.044	0.307			0.758	0.384		
\$26 000–\$49 999	0.119	0.731			0.812	0.367		
\$50 000 and higher	0.089	0.776			0.229	0.632		
Employment								
Employed (REF)								
Unemployed	1.719	0.190			0.116	0.734		
<i>Step 2: Cigarette smoking</i>								
Smoking								
Non-smoker (REF)								
Smoker	2.126	0.145			0.000	0.996		
Type								
Non-menthol (REF)								
Menthol	0.753	0.386			4.365	0.037	0.205	0.046 to 0.907
Both	2.341	0.126			0.488	0.485		

*Not significant.

REF, reference group.

might be associated with smoking any cigarette and non-cigarette product available. Studies of the possible role of these factors in polytobacco use among African-Americans are needed.

The 14.9% prevalence of the past 30-day smoking of non-cigarette products by non-cigarette smokers also is a concern. Smoking blunts and bidis was not associated with cigarette smoking but was strongly associated with youth. This suggests that smoking blunts and bidis might reflect youthful experimentation,^{13 15 17} and raises questions about whether young African-Americans try these before they try cigarettes.¹³ Studies of age of initiating smoking of cigarettes versus blunts and cigarillos among African-Americans are needed to clarify this.

This study also found a substantial prevalence of smoking products that are not assessed in most population smoking surveys of adults (eg, marijuana, cigarillos, blunts). Hence, it would be beneficial for surveillance studies to assess smoking of blunts, bidis and (in particular) cigarillos such as *Phillies*, *Black & Mild* and *Swisher Sweets*. Smoking of cigarillos may need to be assessed by brand name because young African-Americans often do not categorise them as cigars,¹⁸ and hence their reports

of cigar use increase significantly when these brand names are included.¹⁸ That these cigarillos are sold individually and come in a variety of flavours (eg, chocolate, apple, cherry) may contribute to their not being categorised as cigars or as cigarettes. Such an assessment will provide a more comprehensive picture of smoking among African-American adults, and would match the complexity of recent (2011) assessments of youth smoking that included bidis, kreteks and cigarillos.³³

This study has several limitations, including the use of self-reports that may be lower than biologically validated data,²⁵ lack of assessment of some forms of tobacco use (eg, pipes) and a Californian sample whose data might not generalise to other states. In addition, we treated age as a categorical variable rather than as a continuous variable, and this may have limited the sensitivity of analyses. We note, however, that the age categories used here are similar to those used in prior studies of polytobacco use in which the highest prevalence found was for 18–24 year olds.^{13–16} Moreover, to decrease the number of consecutive significance tests, potentially interesting interaction effects (eg, gender × age, gender × income) were not examined; such effects, however, are generally

not examined in basic epidemiological studies of product use (33), and this is a limitation of this study and of similar studies. Likewise, because more than 90% of these African-American cigarette-smokers consumed 10 or fewer cigarettes per day, the potential relationships between the number of cigarettes smoked and smoking of other products were not examined. In addition, the prevalence of smoking the products may have changed since this study. This is particularly the case for kreteks (clove cigarettes) that were banned by the 2009 *Family Smoking Prevention and Tobacco Control Act*.³⁴ The Center for Disease Control's 2011 study of youth³³ revealed that youth still smoke kreteks despite the ban, and this suggests that adults also might still smoke them. How youth and adults acquire banned and illegal products is worthy of investigation.

Despite these limitations, this study is the first to highlight the magnitude and complexity of smoking among a random community sample of African-American adults, and the first to underscore the need to improve its assessment in research and practice. More comprehensive, population-level assessment of multiple-substance smoking might yield data that in part explain African-American smokers' difficulty in quitting tobacco despite smoking only a few cigarettes per day^{5,6} and likewise might yield findings that in part explain the puzzling high incidence of smoking-related cancers at young ages among African-American men.^{7,35} Similarly, it would be beneficial for healthcare providers to include non-cigarette products such as bidis and blunts in 5A (ask, advise, assess, assist and arrange) assessment of smoking³⁶ among cigarette smokers and non-smokers alike, young adults in particular. Smoking cessation interventions also might be enhanced by assessing and addressing cessation of smoking such products. However, whether evidence-based smoking cessation interventions and nicotine replacement therapy are effective with polytobacco users remain unknown. Studies are needed to assess the possibility that hidden polytobacco use might contribute to the relative failure of standard smoking cessation programmes with black smokers,^{5,6} and research on the possible need for new cessation interventions for polytobacco users is needed as well.

Contributors IC, HL, JB and DAS have made substantial contributions to study conception and design, acquisition of data, and analysis and interpretation of data, drafting the article or revising it critically for important intellectual content and gave final approval for the final version of the manuscript to be published.

Funding Supported by Tobacco-Related Disease Research Program Grant No. 15AT-1300.

Competing interests None.

Ethics approval Institutional Review Board, San Diego State University.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

Open Access This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 3.0) license,

which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/3.0/>

REFERENCES

- Centers for Disease Control and Prevention. Any tobacco use in 13 states Behavioral Risk Factor Surveillance System, 2008. *MMWR Morb Mortal Wkly Rep* 2010;59:946–50.
- Bombard JM, Pederson LL, Nelson DE, *et al*. Are smokers only using cigarettes? *Addict Behav* 2007;32:2411–19.
- King BA, Dube SR, Tynan MA. Current tobacco use among adults in the United States: findings from the National Adult Tobacco Survey. *Am J Public Health* 2012;102:e99–100.
- Centers for Disease Control and Prevention. Tobacco use among middle and high school students United States, 2000–2009. *MMWR Morb Mortal Wkly Rep* 2010;59:1063–8.
- Fagan P, Moolchan ER, Lawrence D, *et al*. Identifying health disparities across the tobacco continuum. *Addiction* 2007; 102(Suppl 2):5–29.
- Trinidad DR, Pérez-Stable EJ, White MM, *et al*. A nationwide analysis of US racial/ethnic disparities in smoking behaviors, smoking cessation, and cessation-related factors. *Am J Public Health* 2011;101:699–706.
- Haiman CA, Stram DO, Wilkens LR, *et al*. Ethnic and racial differences in smoking-related risk of lung cancer. *New Eng J Med*. 2006;354:333–42.
- Delnevo CD, Hrywna M. The relationship of cigars, marijuana, and blunts to adolescent bidi use. *Public Health Rep* 2006; 121:603–8.
- Molson JL, Lee EM, Murty R, *et al*. Clove cigarette smoking: biochemical, physiological, and subjective effects. *Pharm Biochem Behav* 2003;74:739–45.
- Watson CH, Polzin GM, Calafat AM, *et al*. Determination of the tar, nicotine, and carbon monoxide yields in the smoke of bidi cigarettes. *Nicotine Tob Res* 2003;5:747–53.
- Ganesh B, Sushama S, Monika S, *et al*. A case-control study of risk factors of lung cancer in Mumbai, India. *Asian Pac J Cancer Prev* 2011;12:357–62.
- Jayalekshmi PA, Gangadharan P, Akiba S, *et al*. Oral cavity cancer risk in relation to tobacco chewing and bidi smoking among men in Karunagappally, Kerala, India. *Cancer Sci* 2011;102:460–7.
- Delnevo CD, Pevzner ES, Myrwna M, *et al*. Bidi cigarette use among young adults in 15 states. *Prev Med* 2004;39:207–11.
- Vander Weg MW, Peterson AL, Ebbert JO, *et al*. Prevalence of alternative forms of tobacco use in a population of young adult military recruits. *Addict Behav* 2008;33:69–82.
- Sinclair CF, Foushee HR, Pevear JS, *et al*. Patterns of blunt use among young adult African-American men. *Am J Prev Med* 2012;42:61–4.
- Jolly DH. Exploring the use of little cigars by students at a historically Black university. *Prev Chronic Dis* 2008;5:3–11.
- Page JB, Evans S. Cigars, cigarillos and youth: Emerging patterns and subcultural complexities. *J Ethn Subst Abuse* 2003;2:63–76.
- Yerger VB, Pearson C, Malone R. When is a cigar not a cigar? *Am J Public Health* 2001;91:316–17.
- Blumberg SJ, Luke JV, Cynamon ML. Telephone coverage and health survey estimates: evaluating the need for concern about wireless substitution. *Am J Public Health* 2006;96:926–31.
- Link MW, Mokdad AH, Stackhouse HF, *et al*. Race, ethnicity, and linguistic isolation as determinants of participation in public health surveillance surveys. *Prev Chronic Dis* 2006;3:1–12.
- Satia JA, Galanko JA, Rimer BK. Methods and strategies to recruit African-Americans into cancer prevention surveillance studies. *Cancer Epidemiol Bio Prev* 2005;14:718–21.
- Carroll JK, Yancey AK, Spring B, *et al*. What are successful recruitment and retention strategies for underserved populations? *Translational Behav Med* 2011;234–51.
- Cabral DN, Napoles-Springer AM, Miike R, *et al*. Population- and community-based recruitment of African Americans and Latinos. *Am J Epidemiol* 2003;158:272–9.
- Pichon LC, Corral I, Landrine H, *et al*. Sun protection behaviors among African-Americans. *Am J Prev Med* 2010;38:288–95.
- Fisher MA, Taylor GW, Shelton BJ, *et al*. Age and race/ethnicity-gender predictors of denying smoking, United States. *J Health Care Poor Underserv* 2008;19:75–89.
- Beebe TJ, McRae JA, Harrison PA, *et al*. Mail surveys result in more reports of substance use. *J Clin Epidemiol* 2005;58:421–4.



27. Liao Y, Tucker P, Okoro CA, *et al.* REACH 2010 Surveillance for health status in minority communities. *MMWR Surveill Summ* 2004;53:1–36.
28. Landrine H, Klonoff EA. Racial segregation and cigarette smoking among Blacks. *J Health Psych* 2000;5:211–19.
29. Datta GD, Subramanian SV, Colditz GA, *et al.* Individual, neighborhood, and state-level predictors of smoking among US Black women. *Soc Sci Med* 2006;63:1034–44.
30. Borrell LN, Diez Roux AV, Jacobs DR, *et al.* Perceived racial/ethnic discrimination, smoking, and alcohol consumption in the Multi-Ethnic Study of Atherosclerosis (MESA). *Prev Med* 2010;51:307–12.
31. Shariff-Marco S, Klassen AC, Bowie JV. Racial/ethnic differences in self-reported racism and its association with cancer-related health behaviors. *Am J Public Health* 2010;100:364–74.
32. Corral I, Landrine H. Racial discrimination and health-promoting vs. damaging behaviors among African-American adults. *J Health Psych* 2012;17:1176–82.
33. Centers for Disease Control and Prevention. Tobacco use among middle and high school students United States, 2011. *MMWR Morb Mortal Wkly Rep* 2012;61:581–5.
34. See <http://www.fda.gov/TobaccoProducts/GuidanceComplianceRegulatoryInformation>
35. Elk R, Landrine H. *Cancer disparities*. New York, NY: Springer, 2012.
36. Weglicki LS. Tobacco use assessment: what exactly is your patient using and why is it important to know? *Ethn Dis* 2008;18(3 Suppl 3): S3–6.