



Polytobacco use and multiple-product smoking among a random community sample of African-American Adults

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2013-003606
Article Type:	Research
Date Submitted by the Author:	16-Jul-2013
Complete List of Authors:	Corral, Irma; Brody School of Medicine, East Carolina University, Psychiatric Medicine Landrine, Hope; East Carolina University, Center for Health Disparities Bess, Jukelia; East Carolina University, Center for Health Disparities
Primary Subject Heading:	Smoking and tobacco
Secondary Subject Heading:	Epidemiology
Keywords:	PREVENTIVE MEDICINE, PUBLIC HEALTH, EPIDEMIOLOGY

SCHOLARONE™
Manuscripts

Polytobacco use and multiple-product smoking among a random community sample of
African-American Adults ¹

Irma Corral, Ph.D., MPH ²

Hope Landrine, Ph.D. ³

and Jukelia J. Bess, BS ⁴

Key Words: Smoking, African-Americans, blunts, Philly, polytobacco use

Word Count Text: 2213

Tables: 5

¹ Supported by funds provided by Tobacco-Related Disease Research Program Grant No. 15-AT1300.

² Department of Psychiatric Medicine, Brody School of Medicine, East Carolina University, Greenville, NC 27834.

³ To whom correspondence and reprint requests should be addressed at Center for Health Disparities, East Carolina University, 1800 W. 5th Street, Greenville, NC 27834. Phone: 252-744-5535, FAX: 252-744-2634, Email: landrineh@ecu.edu.

⁴ Center for Health Disparities, East Carolina University, Greenville, NC 27834

Conflicts of interests: The authors have no financial or other conflicts of interests.

Author Contributions

Irma Corral made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Hope Landrine made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Jukelia Bess made substantial contributions to 1) analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

ARTICLE SUMMARY

Article Focus

- This study is the first to examine prevalence of smoking of cigars, bidis, kreteks, blunts, cigarillos (by brand name), and marijuana among a random, statewide sample of 2,118 California Black adult cigarette smokers and non-smokers.
- We hypothesized a high prevalence of smoking blunts and cigarillos, two products that appear to be popular among U.S. Blacks but are rarely assessed in population tobacco surveillance.

Key Messages

- Almost half (49.3%) of Black cigarette smokers, and 14.9 % of cigarette non-smokers had smoked at least one non-cigarette product in the past 30 days, and this was unrelated to socioeconomic status.
- Smokers had a high prevalence of smoking cigarillos (28.7%) and blunts (27.7%).
- These findings reveal a potentially high yet unexamined prevalence of multiple-product smoking among Blacks that involves frequent smoking of the products that are rarely assessed by researchers. This suggests a need for changes in tobacco-use assessment, and in tobacco prevention and cessation programs as well.

Strengths & Limitations

- Strengths include a large, random sample and a high survey response rate.
- Limitations are a California sample whose results may not generalize elsewhere, and use of self-reports that may underestimate tobacco use.

ABSTRACT

Background. Little is known about polytobacco use among African-American adults. This study is the first to examine this among a random, statewide, community sample of Black adults.

Method. Community-based sampling obtained a statewide, random-household sample of N = 2,118 California Black adults, surveyed door-to-door. Past 30-day smoking of cigarettes, blunts, bidis, kreteks, *Philly/Black & Mild*, marijuana, and cigars was examined.

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

Conclusion. Smoking of cigarillos (e.g., *Phillies, Black & Mild*) and blunts may be somewhat prevalent among Black 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 programs, and in healthcare providers' assessment of smoking, and addressed in smoking cessation programs as well.

INTRODUCTION

Polytobacco use refers to the use of cigarettes in combination with another tobacco or smoked product such as cigars, kreteks (clove cigarettes), bidis (hand-rolled, flavored tobacco wrapped in temburi or tendu leaves), and pipes [1-4]. Compared to cigarette smoking, polytobacco use is associated with higher nicotine addiction, greater difficulty quitting tobacco, and increased incidence of smoking-related cancers[1-5]. These three outcomes are more prevalent among Black than White smokers [5-7] even though Blacks smoke significantly fewer cigarettes per day and initiate smoking later in life[5-7]. Possible polytobacco use among Blacks might be relevant to these puzzling tobacco-related racial disparities, and hence assessment of polytobacco use among Black smokers is needed.

Population surveillance studies reveal that polytobacco use among adults (ages ≥ 18) is low, i.e., 2.5% overall, 2.6% for Whites, 2.9% for Blacks [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 incidence of smoking-related cancers is up to 112% higher among bidi- than among cigarette-smokers[11-12]. The sole study of bidi smoking among a large, random sample of adults (i.e., 18-24 year olds in the Behavioral Risk Factor Surveillance System) found that 25.4% of Blacks had ever-smoked bidis, a rate three times higher than that of Whites [13]. Likewise, a study of polytobacco use among military recruits found significantly higher use of bidis (but not of kreteks) among Blacks than Whites[14].

In addition to limited population-data on Black adult smoking of highly-carcinogenic products such as bidis, population studies usually do not assess smoking of the products that are popular in the Black community among cigarette smokers and non-smokers alike. Foremost among these are the thin, flavored, little cigars/cigarillos[15-17] such as *Philly* and *Black & Mild*, that Blacks often do not categorize as cigars[18], and blunts, i.e., *Phillies* emptied of their tobacco and filled with marijuana[8,15-17]. Studies of small convenience samples have found prevalence rates of up to 30% for both products among young Black adults[15-16].

1
2
3
4 Thus, little is known about Black-adult smoking of a variety of non-cigarette products. This
5
6 study reports the first data on the prevalence and correlates of smoking blunts, cigarillos (*Philly/Black*
7
8 & *Mild* by brand name), bidis, kreteks, standard-size cigars, and marijuana among a random, statewide,
9
10 community sample of Black adult smokers (polytobacco use) and non-smokers (multiple-product
11
12 smoking). We hypothesized a high prevalence of polytobacco use among Black cigarette smokers, and
13
14 prevalent smoking of the products that typically are not examined in smoking research.
15
16
17
18

19 METHOD

20 Procedures

21
22 Black participation in telephone and household-interview health surveys is low (e.g., 0.2%–
23
24 20% [19-21]; hence, community-based sampling (CBS) and community-based participatory research
25
26 (CBPR) approaches were used to increase participation rates[22-24]. CBS is a 3-stage, random-
27
28 household probability sampling procedure often used in population studies of minorities to assure
29
30 inclusion of segregated, linguistically-isolated, and phoneless/cell-phone only households; hence CBS
31
32 yields more representative ethnic-minority samples [23-24]. In CBS Stage 1, census data were used to
33
34 identify the counties in which the majority of CA Blacks reside. This revealed that most (90%) of the
35
36 CA Black population resides in 7 counties, e.g., Los Angeles (42%), Sacramento (10%), San Diego
37
38 (6%). Blacks were sampled from these counties proportional to representation, i.e., 42% of the sample
39
40 came from Los Angeles county and 6% from San Diego county (etc.), such that this sample matched
41
42 the distribution of the CA Black population. This was achieved by sampling more or fewer census
43
44 tracts in each county as needed [24].
45
46
47
48
49
50

51 In CBS Stage 2, 513 census tracts (CTS) within the 7 counties were randomly selected. In Stage 3, a
52
53 smaller set of equal numbers of low- (20-50% Blacks) and high-segregated (60-92% Blacks) CTS were
54
55 randomly-selected from the 513, and block-groups within those randomly-selected. Every household in the
56
57 block-groups was sampled door-to-door on weekends, with one adult participant permitted per household.
58
59
60

1
2
3 The door-to-door method assured inclusion of phoneless/cell phone only households. Further details on the
4 method are provided elsewhere[24]. Because cigarette-smoking rates are significantly higher among
5 phoneless/cell phone only households[19], their inclusion here via the door-to-door survey method is likely
6 to yield higher smoking rates than found in random telephone surveys.
7
8
9

10
11
12 The CBPR aspect of the study was co-sponsorship by the California Black Health Network
13 (CBHN), a well-known, trusted organization that has conducted statewide tobacco assessment and tobacco-
14 control programs for CA Blacks since the 1970s. Black-adult surveyors from the CBHN collected the data.
15 Surveyors approached all households in the block groups, introduced themselves as CBHN staff, and asked
16 if a Black adult who resided in the household might wish to complete the brief, anonymous, *California*
17 *Black Health Network* health survey for \$10 cash. Using this approach, the response rate was 99%, i.e., of
18 those who answered the door, 99% completed and only 1% refused the survey[24].
19
20
21
22
23
24
25
26
27
28

29 Because up to 68% of cotinine-determined Black smokers deny smoking (self-report non-smoking)
30 in household interviews[25], a written survey was used instead. Anonymous written surveys decrease
31 socially-desirable denial of smoking and substance use and yield higher smoking and substance-use
32 prevalence rates[26]; hence higher smoking rates are expected here than found in random household
33 surveys. Surveys were left with participants to complete in private, and retrieved 30 minutes later. The
34 study had the approval of the Institutional Review Board of San Diego State University.
35
36
37
38
39
40
41
42

43 **Materials/Measures.**

44
45 The survey assessed Past 30-day Smoking (yes/no) of cigarettes, blunts, bidis, kreteks/clove
46 cigarettes, two cigarillos (small cigars) by brand name (*Philly, Black & Mild*), standard-size cigars, and
47 marijuana. Type of cigarettes smoked (menthol, non-menthol, both) and demographic variables also were
48 assessed. The survey took 20 minutes to complete.
49
50
51
52
53
54

55 **RESULTS**

56
57 Participants were a random, statewide, household-probability sample of N = 2118, US-born, self-
58 identified African-American/Black adult residents of California (CA), 1214 women (57.3%) and 904 men
59
60

(42.7%), whose ages ranged from 18 to 95 years (Mean = 43.8, s.d. = 16.2 years). Details of their demographics have been presented elsewhere[24], and revealed that this sample's demographics are similar to those of the Black population in the CA Census. The prevalence of cigarette smoking among this sample was 32.6%, and significantly higher among men (37.2%) than women (29.7%; $\chi^2 = 10.651$, $p < .001$).

Table 1 displays Past 30-Day Smoking Prevalence Rates for 6 non-cigarette products among cigarette smokers and non-smokers. As shown, prevalence of smoking 1 or more non-cigarette product was 49.3% for cigarette smokers and 14.9% for non-smokers. Among Black men, prevalence of smoking 1 or more non-cigarette product 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 1. Prevalence of Smoking Non-cigarette Products among a random sample of Black Adult Cigarette Smokers and Non-Smokers

Past 30 day Smoking of	Overall %	Smokers ^a %	Non-Smokers ^b %	χ^2_{1} *
Philly; Black & Mild	13.0	28.7	5.3	176.389
Blunts	14.1	27.7	7.5	23.255
Standard Size 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 1 or more of the above	26.1	49.3	14.9	257.73
Men Any 1 or more of the above	33.6	57.3	19.5	114.803
Women Any 1 or more of the above	20.6	40.6	12.1	107.047

^a n = 690 (32.6%), ^b n = 1284 (67.3%), * p = .0005

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 2. Logistic Regression Predicting Black Adult Smoking of Non-Cigarette Products

Model and Variables Entered	β	Wald	P	OR	95% CI	
STEP 1: DEMOGRAPHIC VARIABLES						
Age	45 and older (REF)					
	18-24	1.997	38.442	.0005	7.37	3.919,13.856
	25-34	1.05	17.546	.0005	2.85	1.46,4.656
	35-44	.705	7.882	.005	2.02	1.237,3.311
Gender	Women (REF)					
	Men	.931	22.023	.0005	2.54	1.720,3.742
Education	Didn't Finish High School (REF)					
	High School Graduate/GED	.051	0.022	.882		
	College and higher	-.227	1.078	.299		
Income	Less than \$10,999 (REF)					
	\$11,000 - \$25,999	.330	1.156	.282		
	\$26,000-\$49,999	.524	3.445	.063		
	\$50,000 and higher	-.189	0.437	.508		
Employment	Employed (REF)					
	Unemployed	.075	0.109	.741		
STEP 2: CIGARETTE SMOKING						
Smoking	Non-Smoker (REF)					
	Smoker	1.16	21.760	.0005	3.19	1.962,5.212
Cigarette Type	Non-Menthol(REF)					
	Menthol	.447	3.469	.063		
	Both	.851	7.166	.007	2.34	1.256, 4.366
REF = Reference group						

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

Table 3. Logistic Regressions Predicting Black Adult Smoking of Blunts and of Philly/Black & Mild Cigarillos

Variables Entered	Blunts				Philly/Black & Mild Cigarillos				
	Wald	p	OR	95% CI	Wald	p	OR	95% CI	
STEP 1: Demographics									
Age	45 and older (REF)								
	18-24	29.69	.0005	6.25	3.23,12.08	51.69	.0005	15.90	7.48,33.81
	25-34	13.31	.0005	3.07	1.68,5.62	21.33	.0005	4.23	2.29,7.80
	35-44	7.208	.007	2.38	1.26,4.48	14.22	.0005	3.38	1.79,6.36
Gender	Women (REF)								
	Men	14.10	.0005	2.49	1.55,4.02	14.02	.0005	2.57	1.57,4.21
Education	Not HS Grad (REF)								
	HS Grad/GED	0.82	.365			.928	.335		
	College and higher	1.066	.302			.616	.433		
Income	Less than \$10,999(REF)								
	\$11,000 - \$25,999	3.925	.048	2.17	1.01,4.66	.375	.540		
	\$26,000-\$49,999	4.792	.029	2.18	1.09,4.37	.289	.591		
	\$50,000 and higher	0.051	.821			.089	.766		
Employment	Employed(REF)								
	Unemployed	0.259	.611			1.29	.257		
STEP 2: Cigarette Smoking									
Smoking	Non-Smoker (REF)								
	Smoker	3.767	.052	1.89	.994,3.59 ^a	19.75	.0005	5.34	2.55,11.18
Type	Non-Menthol(REF)								
	Menthol	0.521	.470			6.72	.013	2.36	1.19,4.66
	Both	0.169	.681			15.42	.005	5.08	2.26,11.43

REF = Reference group; ^a = Not Significant

The separate regressions predicting Cigar-Smoking and Marijuana-Smoking (Table 4) found age, gender, and cigarette smoking to be the predictors of both. Men, young adults, and smokers were 2.5 to 3 times more likely to smoke Standard-size Cigars than their reference groups. For Marijuana-Smoking, men were twice as likely, the youngest age group 6 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 ages 18-24 (OR = 4.7) and 35-44 (OR 4.4) more likely to smoke Bidis than the \exists 45 age-group. The regression predicting smoking Kreteks/Cloves (Table 5) revealed that age and smoking menthol cigarettes were the predictors; those ages 35-44 were 11 times more likely, and menthol smokers (OR = 0.205) were less likely to smoke Kreteks/Cloves.

Table 4. Logistic Regressions Predicting Black Adult Smoking of Cigars and of Marijuana

Variables Entered	Standard-size Cigars				Marijuana			
	Wald	p	OR	95% CI	Wald	p	OR	95% CI
Age								
45 and older (REF)								
18-24	9.023	.003	2.99	1.46,6.09	30.68	.0005	6.05	3.20,11.45
25-34	.819	.365			25.30	.0005	4.13	2.38,7.17
35-44	4.132	.042	1.98	1.03,3.82	6.85	.009	2.18	1.22,3.90
Gender								
Women (REF)								
Men	16.823	.0005	3.08	1.80,5.28	11.51	.001	2.14	1.38,3.32
Education								
Not HS Grad (REF)								
HS Grad/GED	.264	.607			1.03	.310		
College and higher	.004	.947			.129	.719		
Income								
Less than \$10,999 (REF)								
\$11,000 - \$25,999	.518	.472			1.35	.245		
\$26,000-\$49,999	2.065	.151			2.14	.143		
\$50,000 and higher	.473	.492			.048	.826		
Employment								
Employed(REF)								
Unemployed	.032	.858			1.08	.300		
STEP 2: Cigarette Smoking								
Smoking								
Non-Smoker (REF)								
Smoker	6.305	.012	2.54	1.23,5.26	9.42	.002	2.55	1.40,4.64
Type								
Non-Menthol(REF)								
Menthol	.162	.687			3.83	.050	1.76	.999,3.09 ^a
Both	1.887	.170			2.74	.098		

REF = Reference group; ^a = Not Significant

Table 5. Logistic Regressions Predicting Black Adult Smoking of Bidis and of Kreteks/Cloves

Variables Entered	Bidis				Kreteks/Clove Cigarettes			
	Wald	p	OR	95% CI	Wald	p	OR	95% CI
STEP 1: Demographics								
Age	45 and older (REF)							
	18-24	4.634	.031	4.74	1.15,19.55	0.000	.997	
	25-34	3.256	.071			3.540	.06	5.79 .929,36.04 ^a
	35-44	5.000	.025	4.43	1.20,16.32	7.265	.007	11.09 1.928,63.79
Gender	Women (REF)							
	Men	1.970	.160			0.179	.672	
Education	Not HS Grad (REF)							
	HS Grad/GED	.000	.990			0.033	.855	
	College and higher	.013	.910			1.447	.229	
Income	Less than \$10,999 (REF)							
	\$11,000 - \$25,999	1.044	.307			0.758	.384	
	\$26,000-\$49,999	.119	.731			0.812	.367	
	\$50,000 and higher	.089	.776			0.229	.632	
Employment	Employed(REF)							
	Unemployed	1.719	.190			0.116	.734	
STEP 2: Cigarette Smoking								
Smoking	Non-Smoker (REF)							
	Smoker	2.126	.145			0.000	.996	
Type	Non-Menthol(REF)							
	Menthol	.753	.386			4.365	.037	0.205 .046,.907
	Both	2.341	.126			0.488	.485	
REF = Reference group; ^a = Not Significant								

DISCUSSION

As hypothesized, there was a high (49.3%) prevalence of polytobacco among Black adult cigarette smokers that held for men (57.3%) and women (40.6%). Substantial smoking of non-cigarette products also was 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

1
2
3 generally were higher for men than women (ORs = 2.5 to 3.0), and for cigarette smokers than non-smokers
4
5 (ORs = 3.2 to 5.3); however, gender did not contribute to smoking bidis or kreteks, and cigarette smoking
6
7 did not contribute to smoking bidis, kreteks, or blunts. Smoking of any non-cigarette product and of each
8
9 specific product generally was highest among adults ages 18-24 years (ORs = 3 to 15.9), and decreased as
10
11 age increased. The exception was smoking kreteks/cloves; for these, older adults were more likely to be
12
13 users. Moreover, unlike the well-known relationship between cigarette smoking and low SES[1,3-5], for
14
15 these non-cigarette products, SES was related only to smoking blunts, with higher incomes a predictor.
16
17 Type of cigarette smoked contributed to smoking non-cigarette products in general, and to smoking
18
19 *Phillies/Blacks* specifically, with higher odds for those who smoked both menthol and non-menthol
20
21 cigarettes, rather than one or the other.
22
23
24
25
26

27 These findings suggest a problematically high prevalence of polytobacco use among Black smokers
28
29 that is strongly associated with gender and young-adulthood but not associated with low income, low
30
31 education, or menthol-smoking. Polytobacco users were mostly young men of varied SES who smoked all
32
33 types of cigarettes along with non-cigarette products B i.e., a possible pattern of smoking whatever is
34
35 available. Given that low-SES was not a risk factor for this, polytobacco use might perhaps instead be
36
37 related to the social risk-factors for cigarette smoking among Blacks that have been identified in prior
38
39 studies, i.e., racial segregation[27-29] and racial discrimination[30-32]. High levels of residential
40
41 segregation (with high exposure to targeted tobacco advertising and easy access to single cigarettes in
42
43 Black neighborhoods), and high levels of (the stress of) racial discrimination might be associated with
44
45 smoking any cigarette and non-cigarette product available. Studies of the possible role of these factors in
46
47 polytobacco use among Blacks are needed.
48
49
50
51
52

53 The 14.9% prevalence of past 30-day smoking of non-cigarette products by non-cigarette smokers
54
55 also is a concern. Smoking blunts and bidis was not associated with cigarette smoking but was strongly
56
57 associated with youth. This suggests that smoking blunts and bidis might reflect youthful
58
59 experimentation[13,15,17], and raises questions about whether young Blacks try these before they try
60

1
2
3 cigarettes[13]. Studies of age of initiating smoking of cigarettes versus blunts and cigarillos among Blacks
4
5 are needed to clarify this.
6
7

8 This study also found a substantial prevalence of smoking products that are not assessed in most
9
10 population smoking surveys (e.g., cigarillos, blunts). Hence, it would be beneficial for surveillance studies
11
12 to assess smoking of blunts, bidis, and cigarillos such as *Phillies*, *Black & Mild*, and *Swisher Sweets*.
13
14 Smoking of cigarillos may need to be assessed by brand name because young Blacks often do not
15
16 categorize them as cigars[18] B and hence their reports of cigar use increase significantly when these brand
17
18 names are included[18]. That these cigarillos are sold individually and come in a variety of flavors (e.g.,
19
20 chocolate, apple, cherry) may contribute to not categorizing them as cigars or cigarettes. Such data will
21
22 provide a more comprehensive picture of smoking in the Black community and its health risks.
23
24
25
26

27 Indeed, more comprehensive, population-level assessment of multiple-substance smoking might
28
29 yield data that in part explain Black difficulty quitting tobacco despite smoking only a few cigarettes per
30
31 day[5-6], and likewise might yield findings that in part explain the puzzling high-incidence of smoking-
32
33 related cancers at young ages among Black men [7,33]. Similarly, it would be beneficial for healthcare
34
35 providers to include non-cigarette products such as bidis and blunts in 5A (ask, advise, assess, assist,
36
37 arrange) assessment of smoking[34] among cigarette smokers and non-smokers alike, young adults in
38
39 particular. Smoking cessation interventions also might be enhanced by assessing and addressing cessation
40
41 of smoking such products. However, whether evidence-based smoking cessation interventions and nicotine
42
43 replacement therapy are effective with polytobacco users remains unknown. Studies are needed to assess
44
45 the possibility that hidden polytobacco use might contribute to the relative failure of standard smoking
46
47 cessation programs with Black smokers[5-6], and research on the possible need for new cessation
48
49 interventions for polytobacco users is needed as well.
50
51
52
53
54

55 Limitations of this study include use of self-reports that may be lower than biologically-validated
56
57 data[25], lack of assessment of some forms of tobacco use (e.g., pipes), and a California sample whose data
58
59 might not generalize to other states. Despite these limitations, this study is the first to highlight the
60

1
2
3 magnitude and complexity of smoking among a random, community sample of Black adults, and the first to
4
5 underscore the need to improve its assessment in research and practice.
6
7

8 **FUNDING**

9
10 Supported by *Tobacco-Related Disease Research Program* Grant No. 15AT-1300.
11

12 **CONTRIBUTORSHIP**

13
14 All authors made substantial contributions to 1) study conception and design, acquisition of data, or
15
16 analysis and interpretation of data; to 2) drafting the article or revising it critically for important
17
18 intellectual content; and gave 3) final approval of the version to be published.
19
20
21

22 **DATA SHARING**

23
24 There are no additional, unpublished data related to this study.
25
26

27 **COMPETING INTERESTS**

28
29 None
30
31

32 **REFERENCES**

- 33
34
35 1. Centers for Disease Control and Prevention. Any tobacco use in 13 states B Behavioral Risk
36
37 Factor Surveillance System, 2008. *MMWR*. 2010; 59(30): 946-950.
38
39 2. Bombard JM, Pederson LL, Nelson DE, Malarcher AM. Are smokers only using cigarettes?
40
41 *Addict Beh*. 2007; 32:2411-2419.
42
43 3. King BA, Dube SR, Tynan. MA. Current tobacco use among adults in the United States: Findings
44
45 from the National Adult Tobacco Survey. *Am J Public Health*. 2012; 102(11):e99-e100.
46
47 4. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School
48
49 StudentsB United States, 2000-2009. *MMWR*. 2010; 59(33):1063-8.
50
51 5. Fagan P, Moolchan ER, Lawrence D, Fernander A, Ponder PK. Identifying health disparities
52
53 across the tobacco continuum. *Addiction*. 2007; 102 (Suppl.2): 5-29.
54
55 6. Trinidad DR, Pérez-Stable EJ, White MM et al. A nationwide analysis of US racial/ethnic
56
57
58
59
60

- 1
2
3 disparities in smoking behaviors, smoking cessation, and cessation-related factors. *Am J Public Health*.
4
5 2011; 101(4):699-706.
6
7
8 7. Haiman CA, Stram DO, Wilkens LR et al. Ethnic and racial differences in smoking-related risk
9
10 of lung cancer. *New Eng J Med*. 2006; 354(4): 333-342.
11
12 8. Delnevo CD, Hrywna M. The relationship of cigars, marijuana, and blunts to adolescent bidi
13
14 use. *Public Health Reports*. 2006; 121(5): 603-608.
15
16
17 9. Malson JL, Lee EM, Murty R, Moolchan ET, Pickworth WB. Clove Cigarette Smoking:
18
19 Biochemical, Physiological, and Subjective Effects. *Pharm., Biochem. Beh.* 2003;74:739B745
20
21
22 10. Watson CH, Polzin GM, Calafat AM, et al. Determination of the Tar, Nicotine, and Carbon
23
24 Monoxide Yields in the Smoke of Bidi Cigarettes. *Nic. Tob. Research*. 2003;5:747B753.
25
26
27 11. Ganesh B, Sushama S, Monika S, Suvarna P. A case-control study of risk factors of lung cancer
28
29 in Mumbai, India. *Asian Pac J Cancer Prev*. 2011; 12(2):357-362.
30
31
32 12. Jayalekshmi PA, Gangadharan P, Akiba S, et al. Oral cavity cancer risk in relation to tobacco
33
34 chewing and bidi smoking among men in Karunagappally, Kerala, India. *Cancer Sci*.2011; 102:460-67.
35
36
37 13. Delnevo CD, Pevzner ES, Myrwna M, Lewis MJ. Bidi cigarette use among young adults in 15
38
39 states. *Prev. Med*. 2004; 39: 207-211.
40
41
42 14. Vander Weg MW, Peterson, AL, Ebbert JO, et al. Prevalence of alternative forms of tobacco
43
44 use in a population of young adult military recruits. *Addict Behav*. 2008; 33: 69-82.
45
46
47 15. Sinclair CF, Foushee HR, Pevear JS et al. Patterns of blunt use among young adult African
48
49 American men. *Am J Prev Med*. 2012; 42(1): 61-64
50
51
52 16. Jolly DH. Exploring the use of little cigars by students at a historically Black university. *Prev*
53
54 *Chronic Dis*. 2008; 5:3-11.
55
56
57 17. Page JB, Evans S. Cigars, cigarillos and youth: Emerging patterns and subcultural complexities.
58
59 *J Ethn Subst Abuse*. 2003; 2(4): 63-76.
60
61
62 18. Yerger VB, Pearson C, Malone R. When is a cigar not a cigar? *Am J Public Health*.

1
2
3 2001;91:316-7.
4

5 19. Blumberg SJ, Luke JV, Cynamon ML. Telephone coverage and health survey estimates:
6 Evaluating the need for concern about wireless substitution. *Am J Public Health*. 2006;96: 926-31.
7

8 20. Link MW, Mokdad AH, Stackhouse HF, et al. Race, ethnicity, and linguistic isolation as
9 determinants of participation in public health surveillance surveys. *Prev Chronic Dis*. 2006; 3:1-12.
10

11 21. Satia JA, Galanko JA, Rimer BK. Methods and strategies to recruit African-Americans into
12 cancer prevention surveillance studies. *Cancer Epi Bio Prev*. 2005; 14(3):718-721.
13

14 22. Carroll, JK, Yancey, AK, Spring, B, et al. What are successful recruitment and retention
15 strategies for underserved populations? *Translational Behav Med*. 2011; 234-251.
16

17 23. Cabral DN, Napoles-Springer AM, Miike R, et al. Population- and community-based
18 recruitment of African Americans and Latinos. *Am J Epi*. 2003; 158: 272-279.
19

20 24. Pichon LC, Corral I, Landrine H., et al. Sun protection behaviors among African
21 Americans. *Am J Prev Med*. 2010; 38(3): 288-295.
22

23 25. Fisher MA, Taylor GW, Shelton BJ, Debanne S. Age and race/ethnicity-gender
24 predictors of denying smoking, United States. *J Health Care Poor Underserv*. 2008; 19: 75-89.
25

26 26. Beebe TJ, McRae JA, Harrison PA, et al. Mail surveys result in more reports of substance use. *J*
27 *Clinical Epi*. 2005; 58: 421-424.
28

29 27. Liao Y, Tucker P, Okoro CA, et al. REACH 2010 Surveillance for Health Status in Minority
30 Communities. *MMWR Surveillance Summaries*. 2004; 53:1-36.
31

32 28. Landrine H, Klonoff EA. Racial segregation and cigarette smoking among Blacks. *J Health*
33 *Psych*. 2000; 5(2): 211-219.
34

35 29. Datta GD, Subramanian SV, Colditz GA, et al. Individual, neighborhood, and state-level
36 predictors of smoking among US Black women. *Soc Sci & Medicine*. 2006; 63, 1034-1044.
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

- 1
2
3 30. Borrell LN, Diez Roux AV, Jacobs DR, et al. Perceived racial/ethnic discrimination, smoking,
4 and alcohol consumption in the Multi-Ethnic Study of Atherosclerosis (MESA). *Prev. Med.* 2010; 51: 307-
5 312.
6
7
8
9
10 31. Shariff-Marco S, Klassen AC, Bowie JV. Racial/ethnic differences in self-reported racism and
11 its association with cancer-related health behaviors. *Am J Public Health.* 2010;100:364-74.
12
13 32. Corral I, Landrine H. Racial Discrimination and Health-Promoting vs. Damaging Behaviors
14 among African-American Adults. *J Health Psych.* 2012; 17: 1176-1182.
15
16 33. Elk R, Landrine H. *Cancer Disparities.* New York, NY: Springer; 2012.
17
18 34. Weglicki LS. Tobacco use assessment: What exactly is your patient using and why is it
19 important to know? *Ethn Dis.* 2008; 18(3 Suppl 3): S3-6.
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any pre-specified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(a) Describe all statistical methods , including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data	15*	Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.



Polytobacco use and multiple-product smoking among a random community sample of African-American Adults

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2013-003606.R1
Article Type:	Research
Date Submitted by the Author:	22-Aug-2013
Complete List of Authors:	Corral, Irma; Brody School of Medicine, East Carolina University, Psychiatric Medicine Landrine, Hope; East Carolina University, Center for Health Disparities Bess, Jukelia; East Carolina University, Center for Health Disparities
Primary Subject Heading:	Smoking and tobacco
Secondary Subject Heading:	Epidemiology, Public health, Smoking and tobacco
Keywords:	PREVENTIVE MEDICINE, PUBLIC HEALTH, EPIDEMIOLOGY

SCHOLARONE™
Manuscripts

Polytobacco use and multiple-product smoking among a random community sample of
African-American Adults ¹

Irma Corral, Ph.D., MPH ²

Hope Landrine, Ph.D. ³

and Jukelia J. Bess, BS ⁴

Key Words: Smoking, African-Americans, blunts, Philly, polytobacco use

Word Count Text: 2504

Tables: 5

¹ Supported by funds provided by Tobacco-Related Disease Research Program Grant No. 15-AT1300.

² Department of Psychiatric Medicine, Brody School of Medicine, East Carolina University, Greenville, NC 27834.

³ To whom correspondence and reprint requests should be addressed at Center for Health Disparities, East Carolina University, 1800 W. 5th Street, Greenville, NC 27834. Phone: 252-744-5535, FAX: 252-744-2634, Email: landrineh@ecu.edu.

⁴ Center for Health Disparities, East Carolina University, Greenville, NC 27834

Conflicts of interests: The authors have no financial or other conflicts of interests.

Author Contributions

Irma Corral made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Hope Landrine made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Jukelia Bess made substantial contributions to 1) analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

ARTICLE SUMMARY

Article Focus

- This study is the first to examine prevalence of smoking of cigars, bidis, kreteks, blunts, cigarillos (by brand name), and marijuana among a random, statewide sample of 2,118 California Black adult cigarette smokers and non-smokers.
- We hypothesized a substantial prevalence of smoking cigarillos and blunts, two products that appear to be popular among U.S. Blacks but are rarely assessed in population tobacco surveillance.

Key Messages

- Almost half (49.3%) of Black cigarette smokers, and 14.9 % of cigarette non-smokers had smoked at least one non-cigarette product in the past 30 days, and this was unrelated to socioeconomic status.
- Smokers had a high prevalence of smoking cigarillos (28.7%) and blunts (27.7%).
- These findings reveal a potentially high yet unexamined prevalence of multiple-product smoking among Blacks that involves frequent smoking of the products that are rarely assessed by researchers. This suggests a need for changes in tobacco-use assessment, and in tobacco prevention and cessation programs as well.

Strengths & Limitations

- Strengths include a large, random sample and a high survey response rate.
- Limitations are a California sample whose results may not generalize elsewhere, and use of self-reports that may underestimate tobacco use.

ABSTRACT

Background. Little is known about polytobacco use among African-American adults. This study is the first to examine this among a random, statewide, community sample of Black adults.

Method. Community-based sampling obtained a statewide, random-household sample of N = 2,118 California Black adults, surveyed door-to-door. Past 30-day smoking of cigarettes, blunts, bidis, kreteks, *Philly/Black & Mild*, marijuana, and cigars was examined.

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

Conclusion. Smoking of cigarillos (e.g., *Phillies, Black & Mild*) and blunts may be somewhat prevalent among Black 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 programs, and in healthcare provider-assessment of smoking, and addressed in smoking cessation programs as well.

INTRODUCTION

Polytobacco use refers to the use of cigarettes in combination with another tobacco or smoked product such as cigars, kreteks (clove cigarettes), bidis (hand-rolled, flavored tobacco wrapped in temburi or tendu leaves), and pipes [1-4]. Compared to cigarette smoking, polytobacco use is associated with higher nicotine addiction, greater difficulty quitting tobacco, and increased incidence of smoking-related cancers[1-5] . These three outcomes are more prevalent among Black than White smokers [5-7] even though Blacks smoke significantly fewer cigarettes per day and initiate smoking later in life[5-7]. Possible polytobacco use among Blacks might be relevant to these puzzling tobacco-related racial disparities, and hence assessment of polytobacco use among Black smokers is needed.

Population surveillance studies reveal that polytobacco use among adults is low, i.e., 2.5% overall, 2.6% for Whites, 2.9% for Blacks [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 incidence of smoking-related cancers is up to 112% higher among bidi- than among cigarette-smokers[11-12]. The sole study of bidi smoking among a large, random sample of adults (i.e., 18-24 year olds in the Behavioral Risk Factor Surveillance System) found that 25.4% of Blacks had ever-smoked bidis, a rate three times higher than that of Whites [13]. Likewise, a study of polytobacco use among military recruits found significantly higher use of bidis (but not of kreteks) among Blacks than Whites[14].

In addition to limited population-data on Black adult smoking of highly-carcinogenic products such as bidis, population studies usually do not assess smoking of the products that are popular in the Black community among cigarette smokers and non-smokers alike. Foremost among these are the thin, flavored, little cigars/cigarillos[15-17] such as *Philly* and *Black & Mild*, that Blacks often do not categorize as cigars[18], and blunts, i.e., *Phillies* emptied of their tobacco and filled with marijuana[8,15-17]. Studies of small convenience samples have found prevalence rates of up to 30% for both products among young Black adults[15-16].

1
2 Thus, little is known about Black-adult smoking of a variety of non-cigarette products. This
3
4 study reports the first data on the prevalence and correlates of smoking blunts, cigarillos (*Philly/Black &*
5
6 *Mild* by brand name), bidis, kreteks, standard-size cigars, and marijuana among a random, statewide,
7
8 community sample of Black adult smokers (polytobacco use) and non-smokers (multiple-product
9
10 smoking).

11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

METHOD

Procedures

Black participation in telephone and household-interview health surveys is low (e.g., 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 3-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 CA Blacks reside. This revealed that most (90%) of the CA Black population resides in 7 counties, e.g., Los Angeles (42%), Sacramento (10%), San Diego (6%). Blacks were sampled from these counties proportional to representation, i.e., 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 CA Black 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 7 counties were randomly selected. In Stage 3, a smaller set of equal numbers of low- (20-50% Blacks) and high-segregated (60-92% Blacks) CTS were randomly-selected from the 513, 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

1 among phoneless/cell phone only households[19], their inclusion here via the door-to-door survey method
2 is likely to yield higher smoking rates than found in random telephone surveys.
3
4
5

6 The CBPR aspect of the study was co-sponsorship by the California Black Health Network
7 (CBHN), a well-known, trusted organization that has conducted statewide tobacco assessment and tobacco-
8 control programs for CA Blacks since the 1970s. CBHN needed a statewide health-assessment to improve
9 its programs, and so co-sponsored the study. CBHN staff (Black adult surveyors) in each county collected
10 the data in their counties. Surveyors wore CBHN ID badges, approached all households in the block
11 groups, introduced themselves as CBHN staff, and stated that the purpose of the survey was to acquire data
12 needed to improve CBHN programs in each Black community. Surveyors handed potential participants an
13 Informed Consent Letter that described the survey, stated this study purpose, and included CBHN phone
14 numbers (in each county) to call. Surveyors then asked if a Black adult resided in the household who might
15 wish to complete the anonymous, *California Black Health Network* health survey for \$10 cash. Using
16 these CBPR approaches, the response rate was 99%, i.e., of those who answered the door, 99% completed
17 and only 1% refused the survey [24].
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34

35 Because up to 68% of cotinine-determined Black smokers deny smoking (self-report non-smoking)
36 in household interviews[25], a written survey was used instead. Anonymous written surveys decrease
37 socially-desirable denial of smoking and substance use and yield higher smoking and substance-use
38 prevalence rates[26]; hence higher smoking rates are expected here than found in random household
39 surveys. Surveys were left with participants to complete in private, and retrieved 30 minutes later. The
40 study had the approval of the Institutional Review Board of San Diego State University.
41
42
43
44
45
46
47
48

49 **Materials/Measures.**

50 The survey assessed the health behaviors on which CBHN desired data (diet, physical activity, sun-
51 safety, smoking of a variety of products); only the smoking data are presented here. We explored Past 30-
52 day Smoking (yes/no) of a variety of products for the first time, because smoking these might have
53 implications for Black smoking-related disparities. Products included cigarettes, blunts, bidis, kreteks/clove
54
55
56
57
58
59
60

cigarettes, two cigarillos (small cigars) by brand name (*Philly, Black & Mild*), standard-size cigars, and marijuana. Type of cigarettes smoked (menthol, non-menthol, both) and demographic variables also were assessed. The survey took 15-30 minutes to complete.

RESULTS

Participants were a random, statewide, household-probability sample of N = 2118, US-born, self-identified African-American/Black adult residents of California (CA), 1214 women (57.3%) and 904 men (42.7%), whose ages ranged from 18 to 95 years (Mean = 43.8, s.d. = 16.2 years). Details of their demographics have been presented elsewhere[24], and revealed that the demographics of this 2006-2008 sample are similar to those of the 2006-2008 Black population in the CA Census. The prevalence of cigarette smoking among this sample was 32.6%, and significantly higher among men (37.2%) than women (29.7%; $\chi^2 = 10.651$, $p < .001$).

Table 1. Prevalence of Smoking Non-cigarette Products among a random sample of Black Adult Cigarette Smokers and Non-Smokers

Past 30 day Smoking of	Overall %	Smokers ^a %	Non-Smokers ^b %	χ^2_{1*}
Philly; Black & Mild	13.0	28.7	5.3	176.389
Blunts	14.1	27.7	7.5	23.255
Standard Size 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 1 or more of the above	26.1	49.3	14.9	257.73
Men Any 1 or more of the above	33.6	57.3	19.5	114.803
Women Any 1 or more of the above	20.6	40.6	12.1	107.047

^a n = 690 (32.6%), ^b n = 1284 (67.3%), * p = .0005

Table 1 displays Past 30-Day Smoking Prevalence Rates for 6 non-cigarette products among cigarette smokers and non-smokers. As shown, prevalence of smoking 1 or more non-cigarette product was

49.3% for cigarette smokers and 14.9% for non-smokers. Among Black men, prevalence of smoking 1 or more non-cigarette product 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 2. Logistic Regression Predicting Black Adult Smoking of Non-Cigarette Products

Model and Variables Entered	B	Wald	P	OR	95% CI
STEP 1: DEMOGRAPHIC VARIABLES					
Age	45 and older (REF)				
	18-24	1.997	38.442	.0005	7.37 3.919,13.856
	25-34	1.05	17.546	.0005	2.85 1.46,4.656
	35-44	.705	7.882	.005	2.02 1.237,3.311
Gender	Women (REF)				
	Men	.931	22.023	.0005	2.54 1.720,3.742
Education	Didn't Finish High School (REF)				
	High School Graduate/GED	.051	0.022	.882	
	College and higher	-.227	1.078	.299	
Income	Less than \$10,999 (REF)				
	\$11,000 - \$25,999	.330	1.156	.282	
	\$26,000-\$49,999	.524	3.445	.063	
	\$50,000 and higher	-.189	0.437	.508	
Employment	Employed (REF)				
	Unemployed	.075	0.109	.741	
STEP 2: CIGARETTE SMOKING					
Smoking	Non-Smoker (REF)				
	Smoker	1.16	21.760	.0005	3.19 1.962,5.212
Cigarette Type	Non-Menthol(REF)				
	Menthol	.447	3.469	.063	
	Both	.851	7.166	.007	2.34 1.256, 4.366
REF = Reference group					

Table 3 displays separate regressions predicting smoking of Blunts and of the cigarillos *Philly* and *Black & Mild*. Age, gender, and higher incomes were predictors of smoking Blunts. The odds of Blunt-smoking were 2.5 times higher for men, and increased as age decreased, with young (ages 18-24) adults 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 & Mild*.

Variables Entered	Blunts				Philly/Black & Mild Cigarillos				
	Wald	P	OR	95% CI	Wald	p	OR	95% CI	
STEP 1: Demographics									
Age	45 and older (REF)								
	18-24	29.69	.0005	6.25	3.23,12.08	51.69	.0005	15.90	7.48,33.81
	25-34	13.31	.0005	3.07	1.68,5.62	21.33	.0005	4.23	2.29,7.80
	35-44	7.208	.007	2.38	1.26,4.48	14.22	.0005	3.38	1.79,6.36
Gender	Women (REF)								
	Men	14.10	.0005	2.49	1.55,4.02	14.02	.0005	2.57	1.57,4.21
Education	Not HS Grad (REF)								
	HS Grad/GED	0.82	.365			.928	.335		
	College and higher	1.066	.302			.616	.433		
Income	Less than \$10,999(REF)								
	\$11,000 - \$25,999	3.925	.048	2.17	1.01,4.66	.375	.540		
	\$26,000-\$49,999	4.792	.029	2.18	1.09,4.37	.289	.591		
	\$50,000 and higher	0.051	.821			.089	.766		
Employment	Employed(REF)								
	Unemployed	0.259	.611			1.29	.257		
STEP 2: Cigarette Smoking									
Smoking	Non-Smoker (REF)								
	Smoker	3.767	.052	1.89	.994,3.59 ^a	19.75	.0005	5.34	2.55,11.18
Type	Non-Menthol(REF)								
	Menthol	0.521	.470			6.72	.013	2.36	1.19,4.66
	Both	0.169	.681			15.42	.005	5.08	2.26,11.43

REF = Reference group; ^a = Not Significant

Table 4. Logistic Regressions Predicting Black Adult Smoking of Cigars and of Marijuana

Variables Entered	Standard-size Cigars				Marijuana				
	Wald	P	OR	95% CI	Wald	p	OR	95% CI	
Age									
45 and older (REF)									
18-24	9.023	.003	2.99	1.46,6.09	30.68	.0005	6.05	3.20,11.45	
25-34	.819	.365			25.30	.0005	4.13	2.38,7.17	
35-44	4.132	.042	1.98	1.03,3.82	6.85	.009	2.18	1.22,3.90	
Gender									
Women (REF)									
Men	16.823	.0005	3.08	1.80,5.28	11.51	.001	2.14	1.38,3.32	
Education									
Not HS Grad (REF)									
HS Grad/GED	.264	.607			1.03	.310			
College and higher	.004	.947			.129	.719			
Income									
Less than \$10,999 (REF)									
\$11,000 - \$25,999	.518	.472			1.35	.245			
\$26,000-\$49,999	2.065	.151			2.14	.143			
\$50,000 and higher	.473	.492			.048	.826			
Employment									
Employed(REF)									
Unemployed	.032	.858			1.08	.300			
STEP 2: Cigarette Smoking									
Smoking									
Non-Smoker (REF)									
Smoker	6.305	.012	2.54	1.23,5.26	9.42	.002	2.55	1.40,4.64	
Type									
Non-Menthol(REF)									
Menthol	.162	.687			3.83	.050	1.76	.999,3.09 ^a	
Both	1.887	.170			2.74	.098			

REF = Reference group; ^a = Not Significant

The separate regressions predicting Cigar-Smoking and Marijuana-Smoking (Table 4) found age, gender, and cigarette smoking to be the predictors of both. Men, young adults, and smokers were 2.5 to 3 times more likely to smoke Standard-size Cigars than their reference groups. For Marijuana-Smoking, men were twice as likely, the youngest age group 6 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 ages 18-24 (OR = 4.7) and 35-44 (OR 4.4) 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 ages 35-44 were 11 times more likely, and menthol smokers (OR = 0.205) were less likely to smoke Kreteks/Cloves.

Table 5. Logistic Regressions Predicting Black Adult Smoking of Bidis and of Kreteks/Cloves

Variables Entered	Bidis				Kreteks/Clove Cigarettes			
	Wald	P	OR	95% CI	Wald	P	OR	95% CI
STEP 1: Demographics								
Age	45 and older (REF)							
	18-24	4.634	.031	4.74	1.15,19.55	0.000	.997	
	25-34	3.256	.071			3.540	.06	5.79 .929,36.04 ^a
	35-44	5.000	.025	4.43	1.20,16.32	7.265	.007	11.09 1.928,63.79
Gender	Women (REF)							
	Men	1.970	.160			0.179	.672	
Education	Not HS Grad (REF)							
	HS Grad/GED	.000	.990			0.033	.855	
	College and higher	.013	.910			1.447	.229	
Income	Less than \$10,999 (REF)							
	\$11,000 - \$25,999	1.044	.307			0.758	.384	
	\$26,000-\$49,999	.119	.731			0.812	.367	
	\$50,000 and higher	.089	.776			0.229	.632	
Employment	Employed(REF)							
	Unemployed	1.719	.190			0.116	.734	
STEP 2: Cigarette Smoking								
Smoking	Non-Smoker (REF)							
	Smoker	2.126	.145			0.000	.996	
Type	Non-Menthol(REF)							
	Menthol	.753	.386			4.365	.037	0.205 .046,.907
	Both	2.341	.126			0.488	.485	

REF = Reference group; ^a = Not Significant

DISCUSSION

There was a high (49.3%) prevalence of polytobacco among Black adult cigarette smokers that held for men (57.3%) and women (40.6%). Substantial smoking of non-cigarette products also was 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 generally were

1
2 higher for men than women (ORs = 2.5 to 3.0), and for cigarette smokers than non-smokers (ORs = 3.2 to
3
4 5.3); however, gender did not contribute to smoking bidis or kreteks, and cigarette smoking did not
5
6 contribute to smoking bidis, kreteks, or blunts. Smoking of any non-cigarette product and of each specific
7
8 product generally was highest among adults ages 18-24 years (ORs = 3 to 15.9), and decreased as age
9
10 increased. The exception was smoking kreteks/cloves; for these, older adults were more likely to be users.
11
12 Moreover, unlike the well-known relationship between cigarette smoking and low SES[1,3-5], for these
13
14 non-cigarette products, SES was related only to smoking blunts, with higher incomes a predictor. Type of
15
16 cigarette smoked contributed to smoking non-cigarette products in general, and to smoking *Phillies/Blacks*
17
18 specifically, with higher odds for those who smoked both menthol and non-menthol cigarettes, rather than
19
20 one or the other; menthol smoking generally did not predict use of other products.
21
22
23
24

25
26 These findings suggest a problematically high prevalence of polytobacco use among Black smokers
27
28 that is strongly associated with gender and young-adulthood but not associated with low income, low
29
30 education, or menthol-smoking. Polytobacco users were mostly young men of varied SES who smoked all
31
32 types of cigarettes along with non-cigarette products, i.e., a possible pattern of smoking whatever is
33
34 available. Given that low-SES was not a risk factor for this, polytobacco use might perhaps instead be
35
36 related to the social risk-factors for cigarette smoking among Blacks that have been identified in prior
37
38 studies, i.e., racial segregation[27-29] and racial discrimination[30-32]. High levels of residential
39
40 segregation (with high exposure to targeted tobacco advertising and easy access to single cigarettes in
41
42 Black neighborhoods), and high levels of (the stress of) racial discrimination might be associated with
43
44 smoking any cigarette and non-cigarette product available. Studies of the possible role of these factors in
45
46 polytobacco use among Blacks are needed.
47
48
49
50

51
52 The 14.9% prevalence of past 30-day smoking of non-cigarette products by non-cigarette smokers
53
54 also is a concern. Smoking blunts and bidis was not associated with cigarette smoking but was strongly
55
56 associated with youth. This suggests that smoking blunts and bidis might reflect youthful experimentation
57
58 [13,15,17], and raises questions about whether young Blacks try these before they try cigarettes[13].
59
60

1
2 Studies of age of initiating smoking of cigarettes versus blunts and cigarillos among Blacks are needed to
3
4 clarify this.

5
6 This study also found a substantial prevalence of smoking products that are not assessed in most
7
8 population smoking surveys of adults (e.g., marijuana, cigarillos, blunts). Hence, it would be beneficial for
9
10 surveillance studies to assess smoking of blunts, bidis, and (in particular) cigarillos such as *Phillies*, *Black*
11
12 *& Mild*, and *Swisher Sweets*. Smoking of cigarillos may need to be assessed by brand name because young
13
14 Blacks often do not categorize them as cigars[18], and hence their reports of cigar use increase significantly
15
16 when these brand names are included[18]. That these cigarillos are sold individually and come in a variety
17
18 of flavors (e.g., chocolate, apple, cherry) may contribute to not categorizing them as cigars or as cigarettes.
19
20 Such assessment will provide a more comprehensive picture of smoking among Black adults, and would
21
22 match the complexity of recent (2011) assessments of youth smoking that included bidis, kreteks and
23
24 cigarillos [35].

25
26 This study has several limitations, including use of self-reports that may be lower than biologically-
27
28 validated data[25], lack of assessment of some forms of tobacco use (e.g., pipes), and a California sample
29
30 whose data might not generalize to other states. In addition, we used categorical instead of continuous
31
32 demographic variables, and these may have limited the sensitivity of analyses. Moreover, to decrease the
33
34 number of consecutive significance tests, potentially-interesting interaction effects (e.g., gender X
35
36 education, gender X age, gender X income) were not examined; such effects however generally are not
37
38 examined in basic, epidemiologic studies of product-use [e.g., 35] and is a limitation of this study and of
39
40 similar studies. Likewise, because more than 90% of these Black cigarette smokers consumed 10 or fewer
41
42 cigarettes per day, potential relationships between number of cigarettes smoked and smoking of other
43
44 products were not examined. In addition, prevalence of smoking the products may have changed since this
45
46 study. This is particularly the case for kreteks (clove cigarettes) that were banned by the 2009 *Family*
47
48 *Smoking Prevention and Tobacco Control Act* [36]. The CDC's 2011 study of youth [35] revealed that
49
50 youth still smoke kreteks despite the ban, and this suggests that adults also might still smoke them. How
51
52
53
54
55
56
57
58
59
60

1 youth and adults acquire banned and illegal products is worthy of investigation.

2
3
4 Despite these limitations, this study is the first to highlight the magnitude and complexity of
5 smoking among a random, community sample of Black adults, and the first to underscore the need to
6 improve its assessment in research and practice. More comprehensive, population-level assessment of
7 multiple-substance smoking might yield data that in part explain Black difficulty quitting tobacco despite
8 smoking only a few cigarettes per day[5-6], and likewise might yield findings that in part explain the
9 puzzling high-incidence of smoking-related cancers at young ages among Black men [7,33]. Similarly, it
10 would be beneficial for healthcare providers to include non-cigarette products such as bidis and blunts in
11 5A (ask, advise, assess, assist, arrange) assessment of smoking [34] among cigarette smokers and non-
12 smokers alike, young adults in particular. Smoking cessation interventions also might be enhanced by
13 assessing and addressing cessation of smoking such products. However, whether evidence-based smoking
14 cessation interventions and nicotine replacement therapy are effective with polytobacco users remains
15 unknown. Studies are needed to assess the possibility that hidden polytobacco use might contribute to the
16 relative failure of standard smoking cessation programs with Black smokers[5-6], and research on the
17 possible need for new cessation interventions for polytobacco users is needed as well.
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

37 FUNDING

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

39 ACKNOWLEDGMENT

40 We are grateful to Denise Adams-Simms and the California Black Health Network.

41 REFERENCES

- 42
43
44
45
46
47
48
49
50 1. Centers for Disease Control and Prevention. Any tobacco use in 13 states B Behavioral Risk
51 Factor Surveillance System, 2008. *MMWR*. 2010; 59(30): 946-950.
52
53
54 2. Bombard JM, Pederson LL, Nelson DE, Malarcher AM. Are smokers only using cigarettes?
55 *Addict Beh*. 2007; 32:2411-2419.
56
57
58
59 3. King BA, Dube SR, Tynan. MA. Current tobacco use among adults in the United States: Findings
60

1 from the National Adult Tobacco Survey. *Am J Public Health*. 2012; 102(11):e99-e100.

2
3
4 4. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School
5 Students^B United States, 2000-2009. *MMWR*. 2010; 59(33):1063-8.

6
7
8
9 5. Fagan P, Moolchan ER, Lawrence D, Fernander A, Ponder PK. Identifying health disparities
10 across the tobacco continuum. *Addiction*. 2007; 102 (Suppl.2): 5-29.

11
12
13 6. Trinidad DR, Pérez-Stable EJ, White MM et al. A nationwide analysis of US racial/ethnic
14 disparities in smoking behaviors, smoking cessation, and cessation-related factors. *Am J Public Health*.
15 2011; 101(4):699-706.

16
17
18 7. Haiman CA, Stram DO, Wilkens LR et al. Ethnic and racial differences in smoking-related risk
19 of lung cancer. *New Eng J Med*. 2006; 354(4): 333-342.

20
21
22 8. Delneveo CD, Hrywna M. The relationship of cigars, marijuana, and blunts to adolescent bidi
23 use. *Public Health Reports*. 2006; 121(5): 603-608.

24
25
26 9. Malson JL, Lee EM, Murty R, Moolchan ET, Pickworth WB. Clove Cigarette Smoking:
27 Biochemical, Physiological, and Subjective Effects. *Pharm., Biochem. Beh.* 2003;74:739^B745

28
29
30 10. Watson CH, Polzin GM, Calafat AM, et al. Determination of the Tar, Nicotine, and Carbon
31 Monoxide Yields in the Smoke of Bidi Cigarettes. *Nic. Tob. Research*. 2003;5:747^B753.

32
33
34 11. Ganesh B, Sushama S, Monika S, Suvarna P. A case-control study of risk factors of lung cancer
35 in Mumbai, India. *Asian Pac J Cancer Prev*. 2011; 12(2):357-362.

36
37
38 12. Jayalekshmi PA, Gangadharan P, Akiba S, et al. Oral cavity cancer risk in relation to tobacco
39 chewing and bidi smoking among men in Karunagappally, Kerala, India. *Cancer Sci*.2011; 102:460-67.

40
41
42 13. Delnevo CD, Pevzner ES, Myrwna M, Lewis MJ. Bidi cigarette use among young adults in 15
43 states. *Prev. Med*. 2004; 39: 207-211.

44
45
46 14. Vander Weg MW, Peterson, AL, Ebbert JO, et al. Prevalence of alternative forms of tobacco
47 use in a population of young adult military recruits. *Addict Behav*. 2008; 33: 69-82.

48
49
50 15. Sinclair CF, Foushee HR, Pevear JS et al. Patterns of blunt use among young adult African
51
52
53
54
55
56
57
58
59
60

1
2 American men. *Am J Prev Med.* 2012; 42(1): 61-64

3
4 16. Jolly DH. Exploring the use of little cigars by students at a historically Black university. *Prev*
5
6
7 *Chronic Dis.* 2008; 5:3-11.

8
9 17. Page JB, Evans S. Cigars, cigarillos and youth: Emerging patterns and subcultural complexities.
10
11
12 *J Ethn Subst Abuse.* 2003; 2(4): 63-76.

13
14 18. Yerger VB, Pearson C, Malone R. When is a cigar not a cigar? *Am J Public Health.*
15
16
17 2001;91:316-7.

18
19 19. Blumberg SJ, Luke JV, Cynamon ML. Telephone coverage and health survey estimates:
20
21
22 Evaluating the need for concern about wireless substitution. *Am J Public Health.* 2006;96: 926-31.

23
24 20. Link MW, Mokdad AH, Stackhouse HF, et al. Race, ethnicity, and linguistic isolation as
25
26
27 determinants of participation in public health surveillance surveys. *Prev Chronic Dis.* 2006; 3:1-12.

28
29 21. Satia JA, Galanko JA, Rimer BK. Methods and strategies to recruit African-Americans into
30
31
32 cancer prevention surveillance studies. *Cancer Epi Bio Prev.* 2005; 14(3):718-721.

33
34 22. Carroll, JK, Yancey, AK, Spring, B, et al. What are successful recruitment and retention
35
36
37 strategies for underserved populations? *Translational Behav Med.* 2011; 234-251.

38
39 23. Cabral DN, Napoles-Springer AM, Miike R, et al. Population- and community-based
40
41
42 recruitment of African Americans and Latinos. *Am J Epi.* 2003; 158: 272-279.

43
44 24. Pichon LC, Corral I, Landrine H., et al. Sun protection behaviors among African
45
46
47 Americans. *Am J Prev Med.* 2010; 38(3): 288-295.

48
49 25. Fisher MA, Taylor GW, Shelton BJ, Debanne S. Age and race/ethnicity-gender
50
51
52 predictors of denying smoking, United States. *J Health Care Poor Underserv.* 2008; 19: 75-89.

53
54 26. Beebe TJ, McRae JA, Harrison PA, et al. Mail surveys result in more reports of substance use. *J*
55
56
57 *Clinical Epi.* 2005; 58: 421-424.

58
59 27. Liao Y, Tucker P, Okoro CA, et al. REACH 2010 Surveillance for Health Status in Minority
60
61
62 Communities. *MMWR Surveillance Summaries.* 2004; 53:1-36.

- 1
2 28. Landrine H, Klonoff EA. Racial segregation and cigarette smoking among Blacks. *J Health*
3
4 *Psych.* 2000; 5(2): 211-219.
5
6 29. Datta GD, Subramanian SV, Colditz GA, et al. Individual, neighborhood, and state-level
7
8 predictors of smoking among US Black women. *Soc Sci & Medicine.* 2006; 63, 1034-1044.
9
10 30. Borrell LN, Diez Roux AV, Jacobs DR, et al. Perceived racial/ethnic discrimination, smoking,
11
12 and alcohol consumption in the Multi-Ethnic Study of Atherosclerosis (MESA). *Prev. Med.* 2010; 51: 307-
13
14 312.
15
16 31. Shariff-Marco S, Klassen AC, Bowie JV. Racial/ethnic differences in self-reported racism and
17
18 its association with cancer-related health behaviors. *Am J Public Health.* 2010;100:364-74.
19
20 32. Corral I, Landrine H. Racial Discrimination and Health-Promoting vs. Damaging Behaviors
21
22 among African-American Adults. *J Health Psych.* 2012; 17: 1176-1182.
23
24 33. Elk R, Landrine H. *Cancer Disparities.* New York, NY: Springer; 2012.
25
26 34. Weglicki LS. Tobacco use assessment: What exactly is your patient using and why is it
27
28 important to know? *Ethn Dis.* 2008; 18(3 Suppl 3): S3-6.
29
30 35. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School
31
32 StudentsB United States, 2011. *MMWR.* 2012; 61(31):581-585.
33
34 36. See <http://www.fda.gov/TobaccoProducts/GuidanceComplianceRegulatoryInformation>.
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any pre-specified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(a) Describe all statistical methods , including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data	15*	Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Polytobacco use and multiple-product smoking among a random community sample of
African-American Adults ¹

Irma Corral, Ph.D., MPH ²

Hope Landrine, Ph.D. ³

and Jukelia J. Bess, BS ⁴

Key Words: Smoking, African-Americans, blunts, Philly, polytobacco use

Word Count Text: 2504

Tables: 5

¹ Supported by funds provided by Tobacco-Related Disease Research Program Grant No. 15-AT1300.

² Department of Psychiatric Medicine, Brody School of Medicine, East Carolina University, Greenville, NC 27834.

³ To whom correspondence and reprint requests should be addressed at Center for Health Disparities, East Carolina University, 1800 W. 5th Street, Greenville, NC 27834. Phone: 252-744-5535, FAX: 252-744-2634, Email: landrineh@ecu.edu.

⁴ Center for Health Disparities, East Carolina University, Greenville, NC 27834

Conflicts of interests: The authors have no financial or other conflicts of interests.

Author Contributions

Irma Corral made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Hope Landrine made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Jukelia Bess made substantial contributions to 1) analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

ARTICLE SUMMARY

Article Focus

- This study is the first to examine prevalence of smoking of cigars, bidis, kreteks, blunts, cigarillos (by brand name), and marijuana among a random, statewide sample of 2,118 California Black adult cigarette smokers and non-smokers.
- **We hypothesized a substantial prevalence** of smoking cigarillos and blunts, two products that appear to be popular among U.S. Blacks but are rarely assessed in population tobacco surveillance.

Key Messages

- Almost half (49.3%) of Black cigarette smokers, and 14.9 % of cigarette non-smokers had smoked at least one non-cigarette product in the past 30 days, and this was unrelated to socioeconomic status.
- Smokers had a high prevalence of smoking cigarillos (28.7%) and blunts (27.7%).
- These findings reveal a potentially high yet unexamined prevalence of multiple-product smoking among Blacks that involves frequent smoking of the products that are rarely assessed by researchers. This suggests a need for changes in tobacco-use assessment, and in tobacco prevention and cessation programs as well.

Strengths & Limitations

- Strengths include a large, random sample and a high survey response rate.
- Limitations are a California sample whose results may not generalize elsewhere, and use of self-reports that may underestimate tobacco use.

ABSTRACT

Background. Little is known about polytobacco use among African-American adults. This study is the first to examine this among a random, statewide, community sample of Black adults.

Method. Community-based sampling obtained a statewide, random-household sample of N = 2,118 California Black adults, surveyed door-to-door. Past 30-day smoking of cigarettes, blunts, bidis, kreteks, *Philly/Black & Mild*, marijuana, and cigars was examined.

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

Conclusion. Smoking of cigarillos (e.g., *Phillies, Black & Mild*) and blunts may be somewhat prevalent among Black 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 programs, and in healthcare provider-assessment of smoking, and addressed in smoking cessation programs as well.

INTRODUCTION

Polytobacco use refers to the use of cigarettes in combination with another tobacco or smoked product such as cigars, kreteks (clove cigarettes), bidis (hand-rolled, flavored tobacco wrapped in temburi or tendu leaves), and pipes [1-4]. Compared to cigarette smoking, polytobacco use is associated with higher nicotine addiction, greater difficulty quitting tobacco, and increased incidence of smoking-related cancers[1-5] . These three outcomes are more prevalent among Black than White smokers [5-7] even though Blacks smoke significantly fewer cigarettes per day and initiate smoking later in life[5-7]. Possible polytobacco use among Blacks might be relevant to these puzzling tobacco-related racial disparities, and hence assessment of polytobacco use among Black smokers is needed.

Population surveillance studies reveal that polytobacco use among adults is low, i.e., 2.5% overall, 2.6% for Whites, 2.9% for Blacks [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 incidence of smoking-related cancers is up to 112% higher among bidi- than among cigarette-smokers[11-12]. The sole study of bidi smoking among a large, random sample of adults (i.e., 18-24 year olds in the Behavioral Risk Factor Surveillance System) found that 25.4% of Blacks had ever-smoked bidis, a rate three times higher than that of Whites [13]. Likewise, a study of polytobacco use among military recruits found significantly higher use of bidis (but not of kreteks) among Blacks than Whites[14].

In addition to limited population-data on Black adult smoking of highly-carcinogenic products such as bidis, population studies usually do not assess smoking of the products that are popular in the Black community among cigarette smokers and non-smokers alike. Foremost among these are the thin, flavored, little cigars/cigarillos[15-17] such as *Philly* and *Black & Mild*, that Blacks often do not categorize as cigars[18], and blunts, i.e., *Phillies* emptied of their tobacco and filled with marijuana[8,15-17]. Studies of small convenience samples have found prevalence rates of up to 30% for both products among young Black adults[15-16].

1
2 Thus, little is known about Black-adult smoking of a variety of non-cigarette products. This
3
4 study reports the first data on the prevalence and correlates of smoking blunts, cigarillos (*Philly/Black &*
5
6 *Mild* by brand name), bidis, kreteks, standard-size cigars, and marijuana among a random, statewide,
7
8 community sample of Black adult smokers (polytobacco use) and non-smokers (multiple-product
9
10 smoking).
11
12

13 14 METHOD

15 16 Procedures

17
18 Black participation in telephone and household-interview health surveys is low (e.g., 0.2%-20%
19
20 [19-21]; hence, community-based sampling (CBS) and community-based participatory research (CBPR)
21
22 approaches were used to increase participation rates[22-24]. CBS is a 3-stage, random-household
23
24 probability sampling procedure often used in population studies of minorities to assure inclusion of
25
26 segregated, linguistically-isolated, and phoneless/cell-phone only households; hence CBS yields more
27
28 representative ethnic-minority samples [23-24]. In CBS Stage 1, census data were used to identify the
29
30 counties in which the majority of CA Blacks reside. This revealed that most (90%) of the CA Black
31
32 population resides in 7 counties, e.g., Los Angeles (42%), Sacramento (10%), San Diego (6%). Blacks
33
34 were sampled from these counties proportional to representation, i.e., 42% of the sample came from Los
35
36 Angeles county and 6% from San Diego county (etc.), such that this sample matched the distribution of
37
38 the CA Black population. This was achieved by sampling more or fewer census tracts in each county as
39
40 needed [24].
41
42
43
44
45

46
47 In CBS Stage 2, 513 census tracts (CTS) within the 7 counties were randomly selected. In Stage 3, a
48
49 smaller set of equal numbers of low- (20-50% Blacks) and high-segregated (60-92% Blacks) CTS were
50
51 randomly-selected from the 513, and block-groups within those randomly-selected. Every household in the
52
53 block-groups was sampled door-to-door on weekends 2006-2008, with one adult participant permitted per
54
55 household. The door-to-door method assured inclusion of phoneless/cell phone only households. Further
56
57 details on the method are provided elsewhere[24]. Because cigarette-smoking rates are significantly higher
58
59
60

1 among phoneless/cell phone only households[19], their inclusion here via the door-to-door survey method
2
3 is likely to yield higher smoking rates than found in random telephone surveys.
4
5

6 The CBPR aspect of the study was co-sponsorship by the California Black Health Network
7 (CBHN), a well-known, trusted organization that has conducted statewide tobacco assessment and tobacco-
8 control programs for CA Blacks since the 1970s. CBHN needed a statewide health-assessment to improve
9 its programs, and so co-sponsored the study. CBHN staff (Black adult surveyors) in each county collected
10 the data in their counties. Surveyors wore CBHN ID badges, approached all households in the block
11 groups, introduced themselves as CBHN staff, and stated that the purpose of the survey was to acquire data
12 needed to improve CBHN programs in each Black community. Surveyors handed potential participants an
13 Informed Consent Letter that described the survey, stated this study purpose, and included CBHN phone
14 numbers (in each county) to call. Surveyors then asked if a Black adult resided in the household who might
15 wish to complete the anonymous, *California Black Health Network* health survey for \$10 cash. Using
16 these CBPR approaches, the response rate was 99%, i.e., of those who answered the door, 99% completed
17 and only 1% refused the survey [24].
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34

35 Because up to 68% of cotinine-determined Black smokers deny smoking (self-report non-smoking)
36 in household interviews[25], a written survey was used instead. Anonymous written surveys decrease
37 socially-desirable denial of smoking and substance use and yield higher smoking and substance-use
38 prevalence rates[26]; hence higher smoking rates are expected here than found in random household
39 surveys. Surveys were left with participants to complete in private, and retrieved 30 minutes later. The
40 study had the approval of the Institutional Review Board of San Diego State University.
41
42
43
44
45
46
47
48

49 **Materials/Measures.**

50 The survey assessed the health behaviors on which CBHN desired data (diet, physical activity, sun-
51 safety, smoking of a variety of products); only the smoking data are presented here. We explored Past 30-
52 day Smoking (yes/no) of a variety of products for the first time, because smoking these might have
53 implications for Black smoking-related disparities. Products included cigarettes, blunts, bidis, kreteks/clove
54
55
56
57
58
59
60

cigarettes, two cigarillos (small cigars) by brand name (*Philly, Black & Mild*), standard-size cigars, and marijuana. Type of cigarettes smoked (menthol, non-menthol, both) and demographic variables also were assessed. **The survey took 15-30 minutes to complete.**

RESULTS

Participants were a random, statewide, household-probability sample of N = 2118, US-born, self-identified African-American/Black adult residents of California (CA), 1214 women (57.3%) and 904 men (42.7%), whose ages ranged from 18 to 95 years (Mean = 43.8, s.d. = 16.2 years). Details of their demographics have been presented elsewhere[24], and revealed that the demographics of this **2006-2008** sample are similar to those of **the 2006-2008 Black** population in the CA Census. The prevalence of cigarette smoking among this sample was 32.6%, and significantly higher among men (37.2%) than women (29.7%; $\chi^2 = 10.651, p < .001$).

Table 1. Prevalence of Smoking Non-cigarette Products among a random sample of Black Adult Cigarette Smokers and Non-Smokers

Past 30 day Smoking of	Overall %	Smokers ^a %	Non-Smokers ^b %	$\chi^2_{1^*}$
Philly; Black & Mild	13.0	28.7	5.3	176.389
Blunts	14.1	27.7	7.5	23.255
Standard Size 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 1 or more of the above	26.1	49.3	14.9	257.73
Men Any 1 or more of the above	33.6	57.3	19.5	114.803
Women Any 1 or more of the above	20.6	40.6	12.1	107.047

^a n = 690 (32.6%), ^b n = 1284 (67.3%), * p = .0005

Table 1 displays Past 30-Day Smoking Prevalence Rates for 6 non-cigarette products among cigarette smokers and non-smokers. As shown, prevalence of smoking 1 or more non-cigarette product was

49.3% for cigarette smokers and 14.9% for non-smokers. Among Black men, prevalence of smoking 1 or more non-cigarette product 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 2. Logistic Regression Predicting Black Adult Smoking of Non-Cigarette Products

Model and Variables Entered	B	Wald	P	OR	95% CI	
STEP 1: DEMOGRAPHIC VARIABLES						
Age	45 and older (REF)					
	18-24	1.997	38.442	.0005	7.37	3.919,13.856
	25-34	1.05	17.546	.0005	2.85	1.46,4.656
	35-44	.705	7.882	.005	2.02	1.237,3.311
Gender	Women (REF)					
	Men	.931	22.023	.0005	2.54	1.720,3.742
Education	Didn't Finish High School (REF)					
	High School Graduate/GED	.051	0.022	.882		
	College and higher	-.227	1.078	.299		
Income	Less than \$10,999 (REF)					
	\$11,000 - \$25,999	.330	1.156	.282		
	\$26,000-\$49,999	.524	3.445	.063		
	\$50,000 and higher	-.189	0.437	.508		
Employment	Employed (REF)					
	Unemployed	.075	0.109	.741		
STEP 2: CIGARETTE SMOKING						
Smoking	Non-Smoker (REF)					
	Smoker	1.16	21.760	.0005	3.19	1.962,5.212
Cigarette Type	Non-Menthol(REF)					
	Menthol	.447	3.469	.063		
	Both	.851	7.166	.007	2.34	1.256, 4.366

REF = Reference group

Table 3 displays separate regressions predicting smoking of Blunts and of the cigarillos *Philly* and *Black & Mild*. Age, gender, and higher incomes were predictors of smoking Blunts. The odds of Blunt-smoking were 2.5 times higher for men, and increased as age decreased, with young (ages 18-24) adults 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 & Mild*.

Table 3. Logistic Regressions Predicting Black Adult Smoking of Blunts and of Philly/Black & Mild Cigarillos

Variables Entered		Blunts				Philly/Black & Mild Cigarillos			
		Wald	P	OR	95% CI	Wald	p	OR	95% CI
STEP 1: Demographics									
Age	45 and older (REF)								
	18-24	29.69	.0005	6.25	3.23,12.08	51.69	.0005	15.90	7.48,33.81
	25-34	13.31	.0005	3.07	1.68,5.62	21.33	.0005	4.23	2.29,7.80
	35-44	7.208	.007	2.38	1.26,4.48	14.22	.0005	3.38	1.79,6.36
Gender	Women (REF)								
	Men	14.10	.0005	2.49	1.55,4.02	14.02	.0005	2.57	1.57,4.21
Education	Not HS Grad (REF)								
	HS Grad/GED	0.82	.365			.928	.335		
	College and higher	1.066	.302			.616	.433		
Income	Less than \$10,999(REF)								
	\$11,000 - \$25,999	3.925	.048	2.17	1.01,4.66	.375	.540		
	\$26,000-\$49,999	4.792	.029	2.18	1.09,4.37	.289	.591		
	\$50,000 and higher	0.051	.821			.089	.766		
Employment									
	Employed(REF)								
	Unemployed	0.259	.611			1.29	.257		
STEP 2: Cigarette Smoking									
Smoking Type	Non-Smoker (REF)								
	Smoker	3.767	.052	1.89	.994,3.59 ^a	19.75	.0005	5.34	2.55,11.18
	Non-Menthol(REF)								
	Menthol	0.521	.470			6.72	.013	2.36	1.19,4.66
	Both	0.169	.681			15.42	.005	5.08	2.26,11.43

REF = Reference group; ^a = Not Significant

For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

Table 4. Logistic Regressions Predicting Black Adult Smoking of Cigars and of Marijuana

Variables Entered	Standard-size Cigars				Marijuana				
	Wald	P	OR	95% CI	Wald	p	OR	95% CI	
Age 45 and older (REF)									
18-24	9.023	.003	2.99	1.46,6.09	30.68	.0005	6.05	3.20,11.45	
25-34	.819	.365			25.30	.0005	4.13	2.38,7.17	
35-44	4.132	.042	1.98	1.03,3.82	6.85	.009	2.18	1.22,3.90	
Gender Women (REF)									
Men	16.823	.0005	3.08	1.80,5.28	11.51	.001	2.14	1.38,3.32	
Education Not HS Grad (REF)									
HS Grad/GED	.264	.607			1.03	.310			
College and higher	.004	.947			.129	.719			
Income Less than \$10,999 (REF)									
\$11,000 - \$25,999	.518	.472			1.35	.245			
\$26,000-\$49,999	2.065	.151			2.14	.143			
\$50,000 and higher	.473	.492			.048	.826			
Employment									
Employed(REF)									
Unemployed	.032	.858			1.08	.300			
STEP 2: Cigarette Smoking									
Smoking Non-Smoker (REF)									
Smoker	6.305	.012	2.54	1.23,5.26	9.42	.002	2.55	1.40,4.64	
Type Non-Menthol(REF)									
Menthol	.162	.687			3.83	.050	1.76	.999,3.09 ^a	
Both	1.887	.170			2.74	.098			

REF = Reference group; ^a = Not Significant

The separate regressions predicting Cigar-Smoking and Marijuana-Smoking (Table 4) found age, gender, and cigarette smoking to be the predictors of both. Men, young adults, and smokers were 2.5 to 3 times more likely to smoke Standard-size Cigars than their reference groups. For Marijuana-Smoking, men were twice as likely, the youngest age group 6 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 ages 18-24 (OR = 4.7) and 35-44 (OR 4.4) 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 ages 35-44 were 11 times more likely, and menthol smokers (OR = 0.205) were less likely to smoke Kreteks/Cloves.

Table 5. Logistic Regressions Predicting Black Adult Smoking of Bidis and of Kreteks/Cloves

Variables Entered	Bidis				Kreteks/Clove Cigarettes			
	Wald	P	OR	95% CI	Wald	P	OR	95% CI
STEP 1: Demographics								
Age	45 and older (REF)							
	18-24	4.634	.031	4.74	1.15,19.55	0.000	.997	
	25-34	3.256	.071			3.540	.06	5.79 .929,36.04 ^a
	35-44	5.000	.025	4.43	1.20,16.32	7.265	.007	11.09 1.928,63.79
Gender	Women (REF)							
	Men	1.970	.160			0.179	.672	
Education	Not HS Grad (REF)							
	HS Grad/GED	.000	.990			0.033	.855	
	College and higher	.013	.910			1.447	.229	
Income	Less than \$10,999 (REF)							
	\$11,000 - \$25,999	1.044	.307			0.758	.384	
	\$26,000-\$49,999	.119	.731			0.812	.367	
	\$50,000 and higher	.089	.776			0.229	.632	
Employment	Employed(REF)							
	Unemployed	1.719	.190			0.116	.734	
STEP 2: Cigarette Smoking								
Smoking	Non-Smoker (REF)							
	Smoker	2.126	.145			0.000	.996	
Type	Non-Menthol(REF)							
	Menthol	.753	.386			4.365	.037	0.205 .046,.907
	Both	2.341	.126			0.488	.485	

REF = Reference group; ^a = Not Significant

DISCUSSION

There was a high (49.3%) prevalence of polytobacco among Black adult cigarette smokers that held for men (57.3%) and women (40.6%). Substantial smoking of non-cigarette products also was found among

1 non-cigarette smokers, with 19.5% of men and 12.1% of women non-smokers smoking at least one non-
2 cigarette product in the past 30 days. The odds of smoking most non-cigarette products generally were
3
4
5
6
7 higher for men than women (ORs = 2.5 to 3.0), and for cigarette smokers than non-smokers (ORs = 3.2 to
8
9 5.3); however, gender did not contribute to smoking bidis or kreteks, and cigarette smoking did not
10
11 contribute to smoking bidis, kreteks, or blunts. Smoking of any non-cigarette product and of each specific
12
13 product generally was highest among adults ages 18-24 years (ORs = 3 to 15.9), and decreased as age
14
15 increased. The exception was smoking kreteks/cloves; for these, older adults were more likely to be users.
16
17 Moreover, unlike the well-known relationship between cigarette smoking and low SES[1,3-5], for these
18
19 non-cigarette products, SES was related only to smoking blunts, with higher incomes a predictor. Type of
20
21 cigarette smoked contributed to smoking non-cigarette products in general, and to smoking *Phillies/Blacks*
22
23 specifically, with higher odds for those who smoked both menthol and non-menthol cigarettes, rather than
24
25 one or the other; **menthol smoking generally did not predict use of other products.**
26
27

28
29
30 These findings suggest a problematically high prevalence of polytobacco use among Black smokers
31
32 that is strongly associated with gender and young-adulthood but not associated with low income, low
33
34 education, or menthol-smoking. Polytobacco users were mostly young men of varied SES who smoked all
35
36 types of cigarettes along with non-cigarette products, i.e., a possible pattern of smoking whatever is
37
38 available. Given that low-SES was not a risk factor for this, polytobacco use might perhaps instead be
39
40 related to the social risk-factors for cigarette smoking among Blacks that have been identified in prior
41
42 studies, i.e., racial segregation[27-29] and racial discrimination[30-32]. High levels of residential
43
44 segregation (with high exposure to targeted tobacco advertising and easy access to single cigarettes in
45
46 Black neighborhoods), and high levels of (the stress of) racial discrimination might be associated with
47
48 smoking any cigarette and non-cigarette product available. Studies of the possible role of these factors in
49
50 polytobacco use among Blacks are needed.
51
52
53
54

55
56 The 14.9% prevalence of past 30-day smoking of non-cigarette products by non-cigarette smokers
57
58 also is a concern. Smoking blunts and bidis was not associated with cigarette smoking but was strongly
59
60

1 associated with youth. This suggests that smoking blunts and bidis might reflect youthful experimentation
2 [13,15,17], and raises questions about whether young Blacks try these before they try cigarettes[13].
3
4
5
6
7 Studies of age of initiating smoking of cigarettes versus blunts and cigarillos among Blacks are needed to
8
9 clarify this.

10
11 This study also found a substantial prevalence of smoking products that are not assessed in most
12 population smoking surveys of adults (e.g., marijuana, cigarillos, blunts). Hence, it would be beneficial for
13 surveillance studies to assess smoking of blunts, bidis, and (in particular) cigarillos such as *Phillies*, *Black*
14 & *Mild*, and *Swisher Sweets*. Smoking of cigarillos may need to be assessed by brand name because young
15 Blacks often do not categorize them as cigars[18], and hence their reports of cigar use increase significantly
16 when these brand names are included[18]. That these cigarillos are sold individually and come in a variety
17 of flavors (e.g., chocolate, apple, cherry) may contribute to not categorizing them as cigars or as cigarettes.
18 Such assessment will provide a more comprehensive picture of smoking among Black adults, and would
19 match the complexity of recent (2011) assessments of youth smoking that included bidis, kreteks and
20 cigarillos [35].
21
22
23
24
25
26
27
28
29
30
31
32
33
34

35 This study has several limitations, including use of self-reports that may be lower than biologically-
36 validated data[25], lack of assessment of some forms of tobacco use (e.g., pipes), and a California sample
37 whose data might not generalize to other states. In addition, we used categorical instead of continuous
38 demographic variables, and these may have limited the sensitivity of analyses. Moreover, to decrease the
39 number of consecutive significance tests, potentially-interesting interaction effects (e.g., gender X
40 education, gender X age, gender X income) were not examined; such effects however generally are not
41 examined in basic, epidemiologic studies of product-use [e.g., 35] and is a limitation of this study and of
42 similar studies. Likewise, because more than 90% of these Black cigarette smokers consumed 10 or fewer
43 cigarettes per day, potential relationships between number of cigarettes smoked and smoking of other
44 products were not examined. In addition, prevalence of smoking the products may have changed since this
45 study. This is particularly the case for kreteks (clove cigarettes) that were banned by the 2009 *Family*
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2 *Smoking Prevention and Tobacco Control Act* [36]. The CDC's 2011 study of youth [35] revealed that
3 youth still smoke kreteks despite the ban, and this suggests that adults also might still smoke them. How
4 youth and adults acquire banned and illegal products is worthy of investigation.
5
6
7

8
9 Despite these limitations, this study is the first to highlight the magnitude and complexity of
10 smoking among a random, community sample of Black adults, and the first to underscore the need to
11 improve its assessment in research and practice. More comprehensive, population-level assessment of
12 multiple-substance smoking might yield data that in part explain Black difficulty quitting tobacco despite
13 smoking only a few cigarettes per day[5-6], and likewise might yield findings that in part explain the
14 puzzling high-incidence of smoking-related cancers at young ages among Black men [7,33]. Similarly, it
15 would be beneficial for healthcare providers to include non-cigarette products such as bidis and blunts in
16 5A (ask, advise, assess, assist, arrange) assessment of smoking [34] among cigarette smokers and non-
17 smokers alike, young adults in particular. Smoking cessation interventions also might be enhanced by
18 assessing and addressing cessation of smoking such products. However, whether evidence-based smoking
19 cessation interventions and nicotine replacement therapy are effective with polytobacco users remains
20 unknown. Studies are needed to assess the possibility that hidden polytobacco use might contribute to the
21 relative failure of standard smoking cessation programs with Black smokers[5-6], and research on the
22 possible need for new cessation interventions for polytobacco users is needed as well.
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

42 **FUNDING**

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

44 **ACKNOWLEDGMENT**

45 We are grateful to Denise Adams-Simms and the California Black Health Network.
46
47
48

49 **REFERENCES**

- 50
51
52
53
54
55 1. Centers for Disease Control and Prevention. Any tobacco use in 13 states B Behavioral Risk
56 Factor Surveillance System, 2008. *MMWR*. 2010; 59(30): 946-950.
57
58 2. Bombard JM, Pederson LL, Nelson DE, Malarcher AM. Are smokers only using cigarettes?
59
60

1
2 *Addict Beh.* 2007; 32:2411-2419.

3
4 3. King BA, Dube SR, Tynan. MA. Current tobacco use among adults in the United States: Findings
5 from the National Adult Tobacco Survey. *Am J Public Health.* 2012; 102(11):e99-e100.

6
7
8
9 4. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School
10 StudentsB United States, 2000-2009. *MMWR.* 2010; 59(33):1063-8.

11
12
13
14 5. Fagan P, Moolchan ER, Lawrence D, Fernander A, Ponder PK. Identifying health disparities
15 across the tobacco continuum. *Addiction.* 2007; 102 (Suppl.2): 5-29.

16
17
18
19 6. Trinidad DR, Pérez-Stable EJ, White MM et al. A nationwide analysis of US racial/ethnic
20 disparities in smoking behaviors, smoking cessation, and cessation-related factors. *Am J Public Health.*
21 2011; 101(4):699-706.

22
23
24
25 7. Haiman CA, Stram DO, Wilkens LR et al. Ethnic and racial differences in smoking-related risk
26 of lung cancer. *New Eng J Med.* 2006; 354(4): 333-342.

27
28
29
30 8. Delneveo CD, Hrywna M. The relationship of cigars, marijuana, and blunts to adolescent bidi
31 use. *Public Health Reports.* 2006; 121(5): 603-608.

32
33
34
35 9. Malson JL, Lee EM, Murty R, Moolchan ET, Pickworth WB. Clove Cigarette Smoking:
36 Biochemical, Physiological, and Subjective Effects. *Pharm., Biochem. Beh.* 2003;74:739B745

37
38
39
40 10. Watson CH, Polzin GM, Calafat AM, et al. Determination of the Tar, Nicotine, and Carbon
41 Monoxide Yields in the Smoke of Bidi Cigarettes. *Nic. Tob. Research.* 2003;5:747B753.

42
43
44
45 11. Ganesh B, Sushama S, Monika S, Suvarna P. A case-control study of risk factors of lung cancer
46 in Mumbai, India. *Asian Pac J Cancer Prev.* 2011; 12(2):357-362.

47
48
49
50 12. Jayalekshmi PA, Gangadharan P, Akiba S, et al. Oral cavity cancer risk in relation to tobacco
51 chewing and bidi smoking among men in Karunagappally, Kerala, India. *Cancer Sci.*2011; 102:460-67.

52
53
54
55 13. Delnevo CD, Pevzner ES, Myrwna M, Lewis MJ. Bidi cigarette use among young adults in 15
56 states. *Prev. Med.* 2004; 39: 207-211.

57
58
59 14. Vander Weg MW, Peterson, AL, Ebbert JO, et al. Prevalence of alternative forms of tobacco
60

1 use in a population of young adult military recruits. *Addict Behav.* 2008; 33: 69-82.

2
3
4 15. Sinclair CF, Foushee HR, Pevear JS et al. Patterns of blunt use among young adult African
5
6 American men. *Am J Prev Med.* 2012; 42(1): 61-64
7

8
9 16. Jolly DH. Exploring the use of little cigars by students at a historically Black university. *Prev*
10
11 *Chronic Dis.* 2008; 5:3-11.
12

13
14 17. Page JB, Evans S. Cigars, cigarillos and youth: Emerging patterns and subcultural complexities.
15
16 *J Ethn Subst Abuse.* 2003; 2(4): 63-76.
17

18
19 18. Yerger VB, Pearson C, Malone R. When is a cigar not a cigar? *Am J Public Health.*
20
21 2001;91:316-7.
22

23
24 19. Blumberg SJ, Luke JV, Cynamon ML. Telephone coverage and health survey estimates:
25
26 Evaluating the need for concern about wireless substitution. *Am J Public Health.* 2006;96: 926-31.
27

28
29 20. Link MW, Mokdad AH, Stackhouse HF, et al. Race, ethnicity, and linguistic isolation as
30
31 determinants of participation in public health surveillance surveys. *Prev Chronic Dis.* 2006; 3:1-12.
32

33
34 21. Satia JA, Galanko JA, Rimer BK. Methods and strategies to recruit African-Americans into
35
36 cancer prevention surveillance studies. *Cancer Epi Bio Prev.* 2005; 14(3):718-721.
37

38
39 22. Carroll, JK, Yancey, AK, Spring, B, et al. What are successful recruitment and retention
40
41 strategies for underserved populations? *Translational Behav Med.* 2011; 234-251.
42

43
44 23. Cabral DN, Napoles-Springer AM, Miike R, et al. Population- and community-based
45
46 recruitment of African Americans and Latinos. *Am J Epi.* 2003; 158: 272-279.
47

48
49 24. Pichon LC, Corral I, Landrine H., et al. Sun protection behaviors among African
50
51 Americans. *Am J Prev Med.* 2010; 38(3): 288-295.
52

53
54 25. Fisher MA, Taylor GW, Shelton BJ, Debanne S. Age and race/ethnicity-gender
55
56 predictors of denying smoking, United States. *J Health Care Poor Underserv.* 2008; 19: 75-89.
57

58
59 26. Beebe TJ, McRae JA, Harrison PA, et al. Mail surveys result in more reports of substance use. *J*
60
Clinical Epi. 2005; 58: 421-424.

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
27. Liao Y, Tucker P, Okoro CA, et al. REACH 2010 Surveillance for Health Status in Minority Communities. *MMWR Surveillance Summaries*. 2004; 53:1-36.
28. Landrine H, Klonoff EA. Racial segregation and cigarette smoking among Blacks. *J Health Psych*. 2000; 5(2): 211-219.
29. Datta GD, Subramanian SV, Colditz GA, et al. Individual, neighborhood, and state-level predictors of smoking among US Black women. *Soc Sci & Medicine*. 2006; 63, 1034-1044.
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: 307-312.
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: 1176-1182.
33. Elk R, Landrine H. *Cancer Disparities*. New York, NY: Springer; 2012.
34. 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.
35. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School StudentsB United States, 2011. *MMWR*. 2012; 61(31):581-585.
36. See <http://www.fda.gov/TobaccoProducts/GuidanceComplianceRegulatoryInformation>.



Polytobacco use and multiple-product smoking among a random community sample of African-American Adults

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2013-003606.R2
Article Type:	Research
Date Submitted by the Author:	31-Oct-2013
Complete List of Authors:	Corral, Irma; Brody School of Medicine, East Carolina University, Psychiatric Medicine Landrine, Hope; East Carolina University, Center for Health Disparities Simms, Denise; California Black Health Network, Bess, Jukelia; East Carolina University, Center for Health Disparities
Primary Subject Heading:	Smoking and tobacco
Secondary Subject Heading:	Epidemiology, Public health, Smoking and tobacco
Keywords:	PREVENTIVE MEDICINE, PUBLIC HEALTH, EPIDEMIOLOGY

SCHOLARONE™
Manuscripts

Peer Review Only

1 Polytobacco use and multiple-product smoking among a random community sample of
2
3 African-American Adults ¹
4
5

6 Irma Corral, Ph.D., MPH ², Hope Landrine, Ph.D. ³, Denise Adams Simms, MPH ⁴
7
8 and Jukelia J. Bess, BS ⁵
9
10

11
12 **Key Words:** Smoking, African-Americans, blunts, Philly, polytobacco use
13

14
15 **Word Count Text:** 2630, **Tables:** 5
16

17 ¹ Supported by funds provided by Tobacco-Related Disease Research Program Grant No. 15-
18 AT1300.
19

20 ² Department of Psychiatric Medicine, Brody School of Medicine, East Carolina
21 University, Greenville, NC 27834.
22

23 ³ To whom correspondence and reprint requests should be addressed at Center for Health
24 Disparities, East Carolina University, 1800 W. 5th Street, Greenville, NC 27834. Phone: 252-744-5535,
25 FAX: 252-744-2634, Email: landrineh@ecu.edu.
26
27

28 ⁴ California Black Health Network, San Diego, California
29

30 ⁵ Center for Health Disparities, East Carolina University, Greenville, NC 27834
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

ABSTRACT

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

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

Participants. Participants were a statewide, random-household sample of N = 2,118 California Black adults who completed a survey on past 30-day smoking of cigarettes, blunts, bidis, kreteks, cigarillos, marijuana, and cigars.

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

Conclusion. Smoking of cigarillos (e.g., *Phillies, Black & Mild*) and blunts may be prevalent among Black 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 programs, and in healthcare provider-assessment of smoking, and addressed in smoking cessation programs as well.

ARTICLE SUMMARY

Article Focus

- This study is the first to examine prevalence of smoking of cigars, bidis, kreteks, blunts, cigarillos (by brand name), and marijuana among a random, statewide sample of 2,118 California Black adult cigarette smokers and non-smokers.
- We hypothesized a substantial prevalence of smoking cigarillos and blunts, two products that appear to be popular among U.S. Blacks but are rarely assessed in population tobacco surveillance.

Key Messages

- Almost half (49.3%) of Black cigarette smokers, and 14.9 % of cigarette non-smokers had smoked at least one non-cigarette product in the past 30 days, and this was unrelated to socioeconomic status.
- Smokers had a high prevalence of smoking cigarillos (28.7%) and blunts (27.7%).
- These findings reveal a potentially high yet unexamined prevalence of multiple-product smoking among Blacks that involves frequent smoking of the products that are rarely assessed by researchers. This suggests a need for changes in tobacco-use assessment, and in tobacco prevention and cessation programs as well.

Strengths & Limitations

- Strengths include a large, random sample and a high survey response rate.
- Limitations are a California sample whose results may not generalize elsewhere, and use of self-reports that may underestimate tobacco use.

INTRODUCTION

Polytobacco use refers to the use of cigarettes in combination with another tobacco or smoked product such as cigars, kreteks (clove cigarettes), bidis (hand-rolled, flavored tobacco wrapped in temburi or tendu leaves), and pipes [1-4]. Compared to cigarette smoking, polytobacco use is associated with higher nicotine addiction, greater difficulty quitting tobacco, and increased incidence of smoking-related cancers[1-5]. These three outcomes are more prevalent among Black than White smokers [5-7] even though Blacks smoke significantly fewer cigarettes per day and initiate smoking later in life[5-7]. Possible polytobacco use among Blacks might be relevant to these puzzling tobacco-related racial disparities, and hence assessment of polytobacco use among Black smokers is needed.

Population surveillance studies reveal that polytobacco use among adults is low, i.e., 2.5% overall, 2.6% for Whites, 2.9% for Blacks [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 incidence of smoking-related cancers is up to 112% higher among bidi- than among cigarette-smokers[11-12]. The sole study of bidi smoking among a large, random sample of adults (i.e., 18-24 year olds in the Behavioral Risk Factor Surveillance System) found that 25.4% of Blacks had ever-smoked bidis, a rate three times higher than that of Whites [13]. Likewise, a study of polytobacco use among military recruits found significantly higher use of bidis (but not of kreteks) among Blacks than Whites[14].

In addition to limited population-data on Black adult smoking of highly-carcinogenic products such as bidis, population studies usually do not assess smoking of the products that are popular in the Black community among cigarette smokers and non-smokers alike. Foremost among these are the thin, flavored, little cigars (i.e., cigarillos [15-17]) such as *Philly* and *Black & Mild* that Blacks often do not categorize as cigars[18], and blunts. 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

1 defined, blunts are tobacco products and have been analyzed in tobacco studies [8,15-17]. Such studies
2
3 found prevalence rates of up to 30% for both products among young Black adults [8,15-17].
4
5

6 Thus, little is known about Black-adult smoking of a variety of non-cigarette products. This study
7
8 reports the first data on the prevalence and correlates of smoking blunts, cigarillos (*Philly/Black & Mild*
9 by brand name), bidis, kreteks, standard-size cigars, and marijuana among a random, statewide,
10
11 community sample of Black adult smokers (*polytobacco use*) and non-smokers (*multiple-product*
12
13 *smoking*). Marijuana is not a tobacco-product, does not contain nicotine, and hence generally is excluded
14
15 from studies of smoking. However, marijuana smoke contains many of the same carcinogens as cigarettes
16
17 and is associated with increased cancer risk; hence, marijuana smoking may be relevant to understanding
18
19 persistent, unexplained smoking-related cancer-disparities among Blacks [37].
20
21
22
23
24
25
26
27

28 METHOD

29 Procedures

30
31 Black participation in telephone and household-interview health surveys is low (e.g., 0.2%-20%
32
33 [19-21]; hence, community-based sampling (CBS) and community-based participatory research (CBPR)
34
35 approaches were used to increase participation rates[22-24]. CBS is a 3-stage, random-household
36
37 probability sampling procedure often used in population studies of minorities to assure inclusion of
38
39 segregated, linguistically-isolated, and phoneless/cell-phone only households; hence CBS yields more
40
41 representative ethnic-minority samples [23-24]. In CBS Stage 1, census data were used to identify the
42
43 counties in which the majority of CA Blacks reside. This revealed that most (90%) of the CA Black
44
45 population resides in 7 counties, e.g., Los Angeles (42%), Sacramento (10%), San Diego (6%). Blacks
46
47 were sampled from these counties proportional to representation, i.e., 42% of the sample came from Los
48
49 Angeles county and 6% from San Diego county (etc.), such that this sample matched the distribution of
50
51 the CA Black population. This was achieved by sampling more or fewer census tracts in each county as
52
53 needed [24].
54
55
56
57
58
59
60

1 In CBS Stage 2, 513 census tracts (CTS) within the 7 counties were randomly selected. In Stage 3,
2 a smaller set of equal numbers of low- (20-50% Blacks) and high-segregated (60-92% Blacks) CTS were
3 randomly-selected from the 513, and block-groups within those randomly-selected. Every household in
4 the block-groups was sampled door-to-door on weekends 2006-2008, with one adult participant permitted
5 per household. The door-to-door method assured inclusion of phoneless/cell phone only households.
6
7 Further details on the method are provided elsewhere[24]. Because cigarette-smoking rates are
8 significantly higher among phoneless/cell phone only households[19], their inclusion here via the door-to-
9 door survey method is likely to yield higher smoking rates than found in random telephone surveys.
10
11

12 The CBPR aspect of the study was co-sponsorship by the California Black Health Network
13 (CBHN), a well-known, trusted organization that has conducted statewide tobacco assessment and
14 tobacco-control programs for CA Blacks since the 1970s. CBHN needed a statewide health-assessment to
15 improve its programs, and so co-sponsored the study. CBHN staff (Black adult surveyors) in each county
16 collected the data in their counties. Surveyors wore CBHN ID badges, approached all households in the
17 block groups, introduced themselves as CBHN staff, and stated that the purpose of the survey was to
18 acquire data needed to improve CBHN programs in each Black community. Surveyors handed potential
19 participants an Informed Consent Letter that described the survey, stated this study purpose, and included
20 CBHN phone numbers (in each county) to call. Surveyors then asked if a Black adult resided in the
21 household who might wish to complete the anonymous, *California Black Health Network* health survey
22 for \$10 cash. Using these CBPR approaches, the response rate was 99%, i.e., of those who answered the
23 door, 99% completed and only 1% refused the survey [24].
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

48 Because up to 68% of cotinine-determined Black smokers deny smoking (self-report non-
49 smoking) in household interviews[25], a written survey was used instead. Anonymous written surveys
50 decrease socially-desirable denial of smoking and substance use and yield higher smoking and substance-
51 use prevalence rates[26]; hence higher smoking rates are expected here than found in random household
52 surveys. Surveys were left with participants to complete in private, and retrieved 30 minutes later. The
53 study had the approval of the Institutional Review Board of San Diego State University.
54
55
56
57
58
59
60

Materials/Measures.

The survey assessed the health behaviors 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-size cigars, and marijuana. Type of cigarettes smoked (menthol, non-menthol, both) and demographic variables also were assessed. The survey took 15-30 minutes.

RESULTS

Participants were a random, statewide, sample of N = 2118, US-born, self-identified African-American/Black adult residents of California (CA), 1214 women (57.3%) and 904 men (42.7%), whose ages ranged from 18 to 95 years (Mean = 43.8, s.d. = 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 CA Census. The prevalence of cigarette smoking among this sample was 32.6%, and significantly higher among men (37.2%) than women (29.7%; $\chi^2 = 10.651$, $p < .001$).

Table 1. Prevalence of Smoking Non-cigarette Products among a random sample of Black Adult Cigarette Smokers and Non-Smokers

Past 30 day Smoking of	Overall %	Smokers ^a %	Non-Smokers ^b %	χ^2_1 *
Philly; Black & Mild	13.0	28.7	5.3	176.389
Blunts	14.1	27.7	7.5	23.255
Standard Size 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 1 or more of the above	26.1	49.3	14.9	257.73
Men Any 1 or more of the above	33.6	57.3	19.5	114.803
Women Any 1 or more of the above	20.6	40.6	12.1	107.047

^a n = 690 (32.6%), ^b n = 1284 (67.3%), * p = .0005

Table 1 displays Past 30-Day Smoking Prevalence Rates for 6 non-cigarette products among cigarette smokers and non-smokers. As shown, prevalence of smoking 1 or more non-cigarette product was 49.3% for cigarette smokers and 14.9% for non-smokers. Among Black men, prevalence of smoking 1 or more non-cigarette product 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

Table 2. Logistic Regression Predicting Black Adult Smoking of Non-Cigarette Products

Model and Variables Entered	B	Wald	P	OR	95% CI
STEP 1: DEMOGRAPHIC VARIABLES					
Age	45 and older (REF)				
	18-24	1.997	38.442	.0005	7.37 3.919,13.856
	25-34	1.05	17.546	.0005	2.85 1.46,4.656
	35-44	.705	7.882	.005	2.02 1.237,3.311
Gender	Women (REF)				
	Men	.931	22.023	.0005	2.54 1.720,3.742
Education	Didn't Finish High School (REF)				
	High School Graduate/GED	.051	0.022	.882	
	College and higher	-.227	1.078	.299	
Income	Less than \$10,999 (REF)				
	\$11,000 - \$25,999	.330	1.156	.282	
	\$26,000-\$49,999	.524	3.445	.063	
	\$50,000 and higher	-.189	0.437	.508	
Employment	Employed (REF)				
	Unemployed	.075	0.109	.741	
STEP 2: CIGARETTE SMOKING					
Smoking	Non-Smoker (REF)				
	Smoker	1.16	21.760	.0005	3.19 1.962,5.212
Cigarette Type	Non-Menthol(REF)				
	Menthol	.447	3.469	.063	
	Both	.851	7.166	.007	2.34 1.256, 4.366

REF = Reference group

more likely to smoke non-cigarette products, and the odds of smoking the products increased with

For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

decreasing age.

Table 3 displays separate regressions predicting smoking of Blunts and of the cigarillos *Philly* and *Black & Mild*. Age, gender, and higher incomes were predictors of smoking Blunts. The odds of Blunt-smoking were 2.5 times higher for men, and increased as age decreased, with young (ages 18-24) adults 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 & Mild*.

Table 3. Logistic Regressions Predicting Black Adult Smoking of Blunts and of Philly/Black & Mild Cigarillos

Variables Entered		Blunts				Philly/Black & Mild Cigarillos			
		Wald	P	OR	95% CI	Wald	p	OR	95% CI
STEP 1: Demographics									
Age	45 and older (REF)								
	18-24	29.69	.0005	6.25	3.23,12.08	51.69	.0005	15.90	7.48,33.81
	25-34	13.31	.0005	3.07	1.68,5.62	21.33	.0005	4.23	2.29,7.80
	35-44	7.208	.007	2.38	1.26,4.48	14.22	.0005	3.38	1.79,6.36
Gender	Women (REF)								
	Men	14.10	.0005	2.49	1.55,4.02	14.02	.0005	2.57	1.57,4.21
Education	Not HS Grad (REF)								
	HS Grad/GED	0.82	.365			.928	.335		
	College and higher	1.066	.302			.616	.433		
Income	Less than \$10,999(REF)								
	\$11,000 - \$25,999	3.925	.048	2.17	1.01,4.66	.375	.540		
	\$26,000-\$49,999	4.792	.029	2.18	1.09,4.37	.289	.591		
	\$50,000 and higher	0.051	.821			.089	.766		
Employment									
	Employed(REF)								
	Unemployed	0.259	.611			1.29	.257		
STEP 2: Cigarette Smoking									
Smoking	Non-Smoker (REF)								
	Smoker	3.767	.052	1.89	.994,3.59 ^a	19.75	.0005	5.34	2.55,11.18
Type	Non-Menthol(REF)								
	Menthol	0.521	.470			6.72	.013	2.36	1.19,4.66
	Both	0.169	.681			15.42	.005	5.08	2.26,11.43

REF = Reference group; ^a = Not Significant

The separate regressions predicting Cigar-Smoking and Marijuana-Smoking (Table 4) found age,
For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

gender, and cigarette smoking to be the predictors of both. Men, young adults, and smokers were 2.5 to 3 times more likely to smoke Standard-size Cigars than their reference groups. For Marijuana-Smoking, men were twice as likely, the youngest age group 6 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 ages 18-24 (OR = 4.7) and 35-44 (OR 4.4) 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 ages 35-44 were 11 times more likely, and menthol smokers (OR = 0.205) were less likely to smoke Kreteks/Cloves.

Table 4. Logistic Regressions Predicting Black Adult Smoking of Cigars and of Marijuana

		Standard-size Cigars				Marijuana			
	Variables Entered	Wald	P	OR	95% CI	Wald	p	OR	95% CI
Age	45 and older (REF)								
	18-24	9.023	.003	2.99	1.46,6.09	30.68	.0005	6.05	3.20,11.45
	25-34	.819	.365			25.30	.0005	4.13	2.38,7.17
	35-44	4.132	.042	1.98	1.03,3.82	6.85	.009	2.18	1.22,3.90
Gender	Women (REF)								
	Men	16.823	.0005	3.08	1.80,5.28	11.51	.001	2.14	1.38,3.32
Education	Not HS Grad (REF)								
	HS Grad/GED	.264	.607			1.03	.310		
	College and higher	.004	.947			.129	.719		
Income	Less than \$10,999 (REF)								
	\$11,000 - \$25,999	.518	.472			1.35	.245		
	\$26,000-\$49,999	2.065	.151			2.14	.143		
	\$50,000 and higher	.473	.492			.048	.826		
Employment	Employed(REF)								
	Unemployed	.032	.858			1.08	.300		
STEP 2: Cigarette Smoking									
Smoking	Non-Smoker (REF)								
	Smoker	6.305	.012	2.54	1.23,5.26	9.42	.002	2.55	1.40,4.64
Type	Non-Menthol(REF)								
	Menthol	.162	.687			3.83	.050	1.76	.999,3.09 ^a
	Both	1.887	.170			2.74	.098		

REF = Reference group; ^a = Not Significant

Table 5. Logistic Regressions Predicting Black Adult Smoking of Bidis and of Kreteks/Cloves

Variables Entered	Bidis				Kreteks/Clove Cigarettes			
	Wald	P	OR	95% CI	Wald	P	OR	95% CI
STEP 1: Demographics								
Age	45 and older (REF)							
	18-24	4.634	.031	4.74	1.15,19.55	0.000	.997	
	25-34	3.256	.071			3.540	.06	5.79 .929,36.04 ^a
	35-44	5.000	.025	4.43	1.20,16.32	7.265	.007	11.09 1.928,63.79
Gender	Women (REF)							
	Men	1.970	.160			0.179	.672	
Education	Not HS Grad (REF)							
	HS Grad/GED	.000	.990			0.033	.855	
	College and higher	.013	.910			1.447	.229	
Income	Less than \$10,999 (REF)							
	\$11,000 - \$25,999	1.044	.307			0.758	.384	
	\$26,000-\$49,999	.119	.731			0.812	.367	
	\$50,000 and higher	.089	.776			0.229	.632	
Employment	Employed(REF)							
	Unemployed	1.719	.190			0.116	.734	
STEP 2: Cigarette Smoking								
Smoking	Non-Smoker (REF)							
	Smoker	2.126	.145			0.000	.996	
Type	Non-Menthol(REF)							
	Menthol	.753	.386			4.365	.037	0.205 .046,.907
	Both	2.341	.126			0.488	.485	

REF = Reference group; ^a = Not Significant

DISCUSSION

There was a high (49.3%) prevalence of polytobacco among Black adult cigarette smokers that held for men (57.3%) and women (40.6%). Substantial smoking of non-cigarette products also was 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 generally

1 were higher for men than women (ORs = 2.5 to 3.0), and for cigarette smokers than non-smokers (ORs =
2 3.2 to 5.3); however, gender did not contribute to smoking bidis or kreteks, and cigarette smoking did not
3 contribute to smoking bidis, kreteks, or blunts. Smoking of any non-cigarette product and of each specific
4 product generally was highest among adults ages 18-24 years (ORs = 3 to 15.9) as in prior studies [13-
5 16], and decreased as age increased. The exception was smoking kreteks/cloves; for these, older adults
6 were more likely to be users. Moreover, unlike the well-known relationship between cigarette smoking
7 and low SES[1,3-5], for these non-cigarette products, SES was related only to smoking blunts, with
8 higher incomes a predictor. Type of cigarette smoked contributed to smoking non-cigarette products in
9 general, and to smoking *Phillies/Blacks* specifically, with higher odds for those who smoked both
10 menthol and non-menthol cigarettes, rather than one or the other; menthol smoking generally did not
11 predict use of other products.
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

27 These findings suggest a problematically high prevalence of polytobacco use among Black
28 smokers that is strongly associated with gender and young-adulthood but not associated with low income,
29 low education, or menthol-smoking. Polytobacco users were mostly young men of varied SES who
30 smoked all types of cigarettes along with non-cigarette products, i.e., a possible pattern of smoking
31 whatever is available. Given that low-SES was not a risk factor for this, polytobacco use might perhaps
32 instead be related to the social risk-factors for cigarette smoking among Blacks that have been identified
33 in prior studies, i.e., racial segregation[27-29] and racial discrimination[30-32]. High levels of residential
34 segregation (with high exposure to targeted tobacco advertising and easy access to single cigarettes in
35 Black neighborhoods), and high levels of (the stress of) racial discrimination might be associated with
36 smoking any cigarette and non-cigarette product available. Studies of the possible role of these factors in
37 polytobacco use among Blacks are needed.
38
39
40
41
42
43
44
45
46
47
48
49
50
51

52 The 14.9% prevalence of past 30-day smoking of non-cigarette products by non-cigarette smokers
53 also is a concern. Smoking blunts and bidis was not associated with cigarette smoking but was strongly
54 associated with youth. This suggests that smoking blunts and bidis might reflect youthful experimentation
55 [13,15,17], and raises questions about whether young Blacks try these before they try cigarettes[13].
56
57
58
59
60

1 Studies of age of initiating smoking of cigarettes versus blunts and cigarillos among Blacks are needed to
2 clarify this.
3

4
5 This study also found a substantial prevalence of smoking products that are not assessed in most
6 population smoking surveys of adults (e.g., marijuana, cigarillos, blunts). Hence, it would be beneficial
7 for surveillance studies to assess smoking of blunts, bidis, and (in particular) cigarillos such as *Phillies*,
8 *Black & Mild*, and *Swisher Sweets*. Smoking of cigarillos may need to be assessed by brand name
9 because young Blacks often do not categorize them as cigars[18], and hence their reports of cigar use
10 increase significantly when these brand names are included[18]. That these cigarillos are sold individually
11 and come in a variety of flavors (e.g., chocolate, apple, cherry) may contribute to not categorizing them as
12 cigars or as cigarettes. Such assessment will provide a more comprehensive picture of smoking among
13 Black adults, and would match the complexity of recent (2011) assessments of youth smoking that
14 included bidis, kreteks and cigarillos [35].
15
16
17
18
19
20
21
22
23
24
25
26
27
28

29 This study has several limitations, including use of self-reports that may be lower than
30 biologically-validated data[25], lack of assessment of some forms of tobacco use (e.g., pipes), and a
31 California sample whose data might not generalize to other states. In addition, we treated age as a
32 categorical instead of a continuous variable, and this may have limited the sensitivity of analyses. We note
33 however that the age categories used here are similar to those used in prior studies of polytobacco use in
34 which the highest prevalence found was for 18-24 year olds [e.g., 13-16]. Moreover, to decrease the
35 number of consecutive significance tests, potentially-interesting interaction effects (e.g., gender X age,
36 gender X income) were not examined; such effects however generally are not examined in basic,
37 epidemiologic studies of product-use [e.g., 35] and is a limitation of this study and of similar studies.
38 Likewise, because more than 90% of these Black cigarette smokers consumed 10 or fewer cigarettes per
39 day, potential relationships between number of cigarettes smoked and smoking of other products were not
40 examined. In addition, prevalence of smoking the products may have changed since this study. This is
41 particularly the case for kreteks (clove cigarettes) that were banned by the 2009 *Family Smoking*
42 *Prevention and Tobacco Control Act* [36]. The CDC's 2011 study of youth [35] revealed that youth still
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1 smoke kreteks despite the ban, and this suggests that adults also might still smoke them. How youth and
2 adults acquire banned and illegal products is worthy of investigation.
3
4

5 Despite these limitations, this study is the first to highlight the magnitude and complexity of
6 smoking among a random, community sample of Black adults, and the first to underscore the need to
7 improve its assessment in research and practice. More comprehensive, population-level assessment of
8 multiple-substance smoking might yield data that in part explain Black difficulty quitting tobacco despite
9 smoking only a few cigarettes per day[5-6], and likewise might yield findings that in part explain the
10 puzzling high-incidence of smoking-related cancers at young ages among Black men [7,33]. Similarly, it
11 would be beneficial for healthcare providers to include non-cigarette products such as bidis and blunts in
12 5A (ask, advise, assess, assist, arrange) assessment of smoking [34] among cigarette smokers and non-
13 smokers alike, young adults in particular. Smoking cessation interventions also might be enhanced by
14 assessing and addressing cessation of smoking such products. However, whether evidence-based smoking
15 cessation interventions and nicotine replacement therapy are effective with polytobacco users remains
16 unknown. Studies are needed to assess the possibility that hidden polytobacco use might contribute to the
17 relative failure of standard smoking cessation programs with Black smokers[5-6], and research on the
18 possible need for new cessation interventions for polytobacco users is needed as well.
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Conflicts of interests:

The authors have no financial or other conflicts of interests.

Author Contributions

Irma Corral made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Hope Landrine made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Jukelia Bess made substantial contributions to 1) analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Denise Adams Simms made substantial contributions to 1) study conception and design, and acquisition of data, 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Funding

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

Data sharing

There are no additional, unpublished data related to this study.

REFERENCES

1. Centers for Disease Control and Prevention. Any tobacco use in 13 states B Behavioral Risk Factor Surveillance System, 2008. *MMWR*. 2010; 59(30): 946-950.
2. Bombard JM, Pederson LL, Nelson DE, Malarcher AM. Are smokers only using cigarettes? *Addict Beh*. 2007; 32:2411-2419.
3. 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(11):e99-e100.
4. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School StudentsB United States, 2000-2009. *MMWR*. 2010; 59(33):1063-8.
5. Fagan P, Moolchan ER, Lawrence D, et al. Identifying health disparities across the tobacco continuum. *Addiction*. 2007; 102 (Suppl.2): 5-29.
6. 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(4):699-706.
7. 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(4): 333-342.
8. Delneveo CD, Hrywna M. The relationship of cigars, marijuana, and blunts to adolescent bidi use. *Public Health Reports*. 2006; 121(5): 603-608.
9. Malson JL, Lee EM, Murty R, et al. Clove Cigarette Smoking: Biochemical, Physiological, and Subjective Effects. *Pharm., Biochem. Beh*. 2003;74:739B745
10. Watson CH, Polzin GM, Calafat AM, et al. Determination of the Tar, Nicotine, and Carbon Monoxide Yields in the Smoke of Bidi Cigarettes. *Nic. Tob. Research*. 2003;5:747B753.
11. 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(2):357-362.
12. 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; 102:460-67.

- 1 13. Delnevo CD, Pevzner ES, Myrwna M, et al. Bidi cigarette use among young adults in 15
2 states. *Prev. Med.* 2004; 39: 207-211.
- 3
4
5 14. Vander Weg MW, Peterson, AL, Ebbert JO, et al. Prevalence of alternative forms of tobacco
6 use in a population of young adult military recruits. *Addict Behav.* 2008; 33: 69-82.
- 7
8
9
10 15. Sinclair CF, Foushee HR, Pevear JS et al. Patterns of blunt use among young adult African
11 American men. *Am J Prev Med.* 2012; 42(1): 61-64
- 12
13
14 16. Jolly DH. Exploring the use of little cigars by students at a historically Black university. *Prev*
15
16
17
18
19
20 17. Page JB, Evans S. Cigars, cigarillos and youth: Emerging patterns and subcultural
21 complexities. *J Ethn Subst Abuse.* 2003; 2(4): 63-76.
- 22
23
24 18. Yerger VB, Pearson C, Malone R. When is a cigar not a cigar? *Am J Public Health.*
25
26
27
28
29 19. Blumberg SJ, Luke JV, Cynamon ML. Telephone coverage and health survey estimates:
30 Evaluating the need for concern about wireless substitution. *Am J Public Health.* 2006;96: 926-31.
- 31
32
33 20. Link MW, Mokdad AH, Stackhouse HF, et al. Race, ethnicity, and linguistic isolation as
34 determinants of participation in public health surveillance surveys. *Prev Chronic Dis.* 2006; 3:1-12.
- 35
36
37
38 21. Satia JA, Galanko JA, Rimer BK. Methods and strategies to recruit African-Americans into
39 cancer prevention surveillance studies. *Cancer Epi Bio Prev.* 2005; 14(3):718-721.
- 40
41
42 22. Carroll, JK, Yancey, AK, Spring, B, et al. What are successful recruitment and retention
43 strategies for underserved populations? *Translational Behav Med.* 2011; 234-251.
- 44
45
46
47 23. Cabral DN, Napoles-Springer AM, Miike R, et al. Population- and community-based
48 recruitment of African Americans and Latinos. *Am J Epi.* 2003; 158: 272-279.
- 49
50
51
52 24. Pichon LC, Corral I, Landrine H., et al. Sun protection behaviors among African
53 Americans. *Am J Prev Med.* 2010; 38(3): 288-295.
- 54
55
56
57 25. Fisher MA, Taylor GW, Shelton BJ, et al. Age and race/ethnicity-gender
58 predictors of denying smoking, United States. *J Health Care Poor Underserv.* 2008; 19: 75-89.
- 59
60

- 1 26. Beebe TJ, McRae JA, Harrison PA, et al. Mail surveys result in more reports of substance use.
2
3 *J Clinical Epi.* 2005; 58: 421-424.
4
- 5 27. Liao Y, Tucker P, Okoro CA, et al. REACH 2010 Surveillance for Health Status in Minority
6
7 Communities. *MMWR Surveillance Summaries.* 2004; 53:1-36.
8
- 9 28. Landrine H, Klonoff EA. Racial segregation and cigarette smoking among Blacks. *J Health*
10
11 *Psych.* 2000; 5(2): 211-219.
12
- 13 29. Datta GD, Subramanian SV, Colditz GA, et al. Individual, neighborhood, and state-level
14
15 predictors of smoking among US Black women. *Soc Sci & Medicine.* 2006; 63, 1034-1044.
16
- 17 30. Borrell LN, Diez Roux AV, Jacobs DR, et al. Perceived racial/ethnic discrimination, smoking,
18
19 and alcohol consumption in the Multi-Ethnic Study of Atherosclerosis (MESA). *Prev. Med.* 2010; 51:
20
21 307-312.
22
- 23 31. Shariff-Marco S, Klassen AC, Bowie JV. Racial/ethnic differences in self-reported racism and
24
25 its association with cancer-related health behaviors. *Am J Public Health.* 2010;100:364-74.
26
- 27 32. Corral I, Landrine H. Racial Discrimination and Health-Promoting vs. Damaging Behaviors
28
29 among African-American Adults. *J Health Psych.* 2012; 17: 1176-1182.
30
- 31 33. Elk R, Landrine H. *Cancer Disparities.* New York, NY: Springer; 2012.
32
- 33 34. Weglicki LS. Tobacco use assessment: What exactly is your patient using and why is it
34
35 important to know? *Ethn Dis.* 2008; 18(3 Suppl 3): S3-6.
36
- 37 35. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School
38
39 StudentsB United States, 2011. *MMWR.* 2012; 61(31):581-585.
40
- 41 36. See <http://www.fda.gov/TobaccoProducts/GuidanceComplianceRegulatoryInformation>.
42
43
44
- 45 37. Hashibe M, Straif K, Tashkin DP, et al. Epidemiologic review of marijuana use and cancer
46
47 risk. 2005. *Alcohol;* 35(3): 265-275.
48
49
50
51
52
53
54
55
56
57
58
59
60

1 Polytobacco use and multiple-product smoking among a random community sample of
2
3 African-American Adults ¹
4

5 Irma Corral, Ph.D., MPH ², Hope Landrine, Ph.D. ³, Denise Adams Simms, MPH ⁴
6
7 and Jukelia J. Bess, BS ⁵
8
9

10
11 **Key Words:** Smoking, African-Americans, blunts, Philly, polytobacco use
12

13 **Word Count Text:** 2630, **Tables:** 5
14

15
16 ¹ Supported by funds provided by Tobacco-Related Disease Research Program Grant No. 15-
17 AT1300.
18

19 ² Department of Psychiatric Medicine, Brody School of Medicine, East Carolina
20 University, Greenville, NC 27834.
21
22

23 ³ To whom correspondence and reprint requests should be addressed at Center for Health
24 Disparities, East Carolina University, 1800 W. 5th Street, Greenville, NC 27834. Phone: 252-744-5535,
25 FAX: 252-744-2634, Email: landrineh@ecu.edu.
26
27
28

29 ⁴ California Black Health Network, San Diego, California
30
31

32 ⁵ Center for Health Disparities, East Carolina University, Greenville, NC 27834
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

ABSTRACT

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

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

Participants. Participants were a statewide, random-household sample of N = 2,118 California Black adults who completed a survey on past 30-day smoking of cigarettes, blunts, bidis, kreteks, cigarillos, marijuana, and cigars.

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

Conclusion. Smoking of cigarillos (e.g., *Phillies, Black & Mild*) and blunts may be prevalent among Black 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 programs, and in healthcare provider-assessment of smoking, and addressed in smoking cessation programs as well.

ARTICLE SUMMARY

Article Focus

- This study is the first to examine prevalence of smoking of cigars, bidis, kreteks, blunts, cigarillos (by brand name), and marijuana among a random, statewide sample of 2,118 California Black adult cigarette smokers and non-smokers.
- We hypothesized a substantial prevalence of smoking cigarillos and blunts, two products that appear to be popular among U.S. Blacks but are rarely assessed in population tobacco surveillance.

Key Messages

- Almost half (49.3%) of Black cigarette smokers, and 14.9 % of cigarette non-smokers had smoked at least one non-cigarette product in the past 30 days, and this was unrelated to socioeconomic status.
- Smokers had a high prevalence of smoking cigarillos (28.7%) and blunts (27.7%).
- These findings reveal a potentially high yet unexamined prevalence of multiple-product smoking among Blacks that involves frequent smoking of the products that are rarely assessed by researchers. This suggests a need for changes in tobacco-use assessment, and in tobacco prevention and cessation programs as well.

Strengths & Limitations

- Strengths include a large, random sample and a high survey response rate.
- Limitations are a California sample whose results may not generalize elsewhere, and use of self-reports that may underestimate tobacco use.

INTRODUCTION

Polytobacco use refers to the use of cigarettes in combination with another tobacco or smoked product such as cigars, kreteks (clove cigarettes), bidis (hand-rolled, flavored tobacco wrapped in temburi or tendu leaves), and pipes [1-4]. Compared to cigarette smoking, polytobacco use is associated with higher nicotine addiction, greater difficulty quitting tobacco, and increased incidence of smoking-related cancers[1-5]. These three outcomes are more prevalent among Black than White smokers [5-7] even though Blacks smoke significantly fewer cigarettes per day and initiate smoking later in life[5-7]. Possible polytobacco use among Blacks might be relevant to these puzzling tobacco-related racial disparities, and hence assessment of polytobacco use among Black smokers is needed.

Population surveillance studies reveal that polytobacco use among adults is low, i.e., 2.5% overall, 2.6% for Whites, 2.9% for Blacks [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 incidence of smoking-related cancers is up to 112% higher among bidi- than among cigarette-smokers[11-12]. The sole study of bidi smoking among a large, random sample of adults (i.e., 18-24 year olds in the Behavioral Risk Factor Surveillance System) found that 25.4% of Blacks had ever-smoked bidis, a rate three times higher than that of Whites [13]. Likewise, a study of polytobacco use among military recruits found significantly higher use of bidis (but not of kreteks) among Blacks than Whites[14].

In addition to limited population-data on Black adult smoking of highly-carcinogenic products such as bidis, population studies usually do not assess smoking of the products that are popular in the Black community among cigarette smokers and non-smokers alike. Foremost among these are the thin, flavored, little cigars (i.e., cigarillos [15-17]) such as *Philly* and *Black & Mild* that Blacks often do not categorize as cigars[18], and blunts. **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**

1 defined, blunts are tobacco products and have been analyzed in tobacco studies [8,15-17]. Such studies
2
3
4 found prevalence rates of up to 30% for both products among young Black adults [8,15-17].
5

6
7 Thus, little is known about Black-adult smoking of a variety of non-cigarette products. This study
8
9 reports the first data on the prevalence and correlates of smoking blunts, cigarillos (*Philly/Black & Mild*
10
11 by brand name), bidis, kreteks, standard-size cigars, and marijuana among a random, statewide,
12
13 community sample of Black adult smokers (*polytobacco use*) and non-smokers (*multiple-product*
14
15 *smoking*). Marijuana is not a tobacco-product, does not contain nicotine, and hence generally is excluded
16
17 from studies of smoking. However, marijuana smoke contains many of the same carcinogens as cigarettes
18
19 and is associated with increased cancer risk; hence, marijuana smoking may be relevant to understanding
20
21 persistent, unexplained smoking-related cancer-disparities among Blacks [37].
22
23
24

25 26 METHOD

27 28 Procedures

29
30 Black participation in telephone and household-interview health surveys is low (e.g., 0.2%-20%
31
32 [19-21]; hence, community-based sampling (CBS) and community-based participatory research (CBPR)
33
34 approaches were used to increase participation rates[22-24]. CBS is a 3-stage, random-household
35
36 probability sampling procedure often used in population studies of minorities to assure inclusion of
37
38 segregated, linguistically-isolated, and phoneless/cell-phone only households; hence CBS yields more
39
40 representative ethnic-minority samples [23-24]. In CBS Stage 1, census data were used to identify the
41
42 counties in which the majority of CA Blacks reside. This revealed that most (90%) of the CA Black
43
44 population resides in 7 counties, e.g., Los Angeles (42%), Sacramento (10%), San Diego (6%). Blacks
45
46 were sampled from these counties proportional to representation, i.e., 42% of the sample came from Los
47
48 Angeles county and 6% from San Diego county (etc.), such that this sample matched the distribution of
49
50 the CA Black population. This was achieved by sampling more or fewer census tracts in each county as
51
52 needed [24].
53
54
55
56
57

58
59 In CBS Stage 2, 513 census tracts (CTS) within the 7 counties were randomly selected. In Stage 3,
60

1 a smaller set of equal numbers of low- (20-50% Blacks) and high-segregated (60-92% Blacks) CTS were
2 randomly-selected from the 513, and block-groups within those randomly-selected. Every household in
3 the block-groups was sampled door-to-door on weekends 2006-2008, with one adult participant permitted
4 per household. The door-to-door method assured inclusion of phoneless/cell phone only households.
5
6 Further details on the method are provided elsewhere[24]. Because cigarette-smoking rates are
7 significantly higher among phoneless/cell phone only households[19], their inclusion here via the door-to-
8 door survey method is likely to yield higher smoking rates than found in random telephone surveys.
9

10 The CBPR aspect of the study was co-sponsorship by the California Black Health Network
11 (CBHN), a well-known, trusted organization that has conducted statewide tobacco assessment and
12 tobacco-control programs for CA Blacks since the 1970s. CBHN needed a statewide health-assessment to
13 improve its programs, and so co-sponsored the study. CBHN staff (Black adult surveyors) in each county
14 collected the data in their counties. Surveyors wore CBHN ID badges, approached all households in the
15 block groups, introduced themselves as CBHN staff, and stated that the purpose of the survey was to
16 acquire data needed to improve CBHN programs in each Black community. Surveyors handed potential
17 participants an Informed Consent Letter that described the survey, stated this study purpose, and included
18 CBHN phone numbers (in each county) to call. Surveyors then asked if a Black adult resided in the
19 household who might wish to complete the anonymous, *California Black Health Network* health survey
20 for \$10 cash. Using these CBPR approaches, the response rate was 99%, i.e., of those who answered the
21 door, 99% completed and only 1% refused the survey [24].
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44

45 Because up to 68% of cotinine-determined Black smokers deny smoking (self-report non-
46 smoking) in household interviews[25], a written survey was used instead. Anonymous written surveys
47 decrease socially-desirable denial of smoking and substance use and yield higher smoking and substance-
48 use prevalence rates[26]; hence higher smoking rates are expected here than found in random household
49 surveys. Surveys were left with participants to complete in private, and retrieved 30 minutes later. The
50 study had the approval of the Institutional Review Board of San Diego State University.
51
52
53
54
55
56
57
58
59
60

Materials/Measures.

The survey assessed the health behaviors 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-size cigars, and marijuana. Type of cigarettes smoked (menthol, non-menthol, both) and demographic variables also were assessed. The survey took 15-30 minutes.

RESULTS

Participants were a random, statewide, sample of N = 2118, US-born, self-identified African-American/Black adult residents of California (CA), 1214 women (57.3%) and 904 men (42.7%), whose ages ranged from 18 to 95 years (Mean = 43.8, s.d. = 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 CA Census. The prevalence of cigarette smoking among this sample was 32.6%, and significantly higher among men (37.2%) than women (29.7%; $\chi^2 = 10.651$, $p < .001$).

Table 1. Prevalence of Smoking Non-cigarette Products among a random sample of Black Adult Cigarette Smokers and Non-Smokers

Past 30 day Smoking of	Overall %	Smokers ^a %	Non-Smokers ^b %	χ^2_1 *
Philly; Black & Mild	13.0	28.7	5.3	176.389
Blunts	14.1	27.7	7.5	23.255
Standard Size 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 1 or more of the above	26.1	49.3	14.9	257.73
Men Any 1 or more of the above	33.6	57.3	19.5	114.803
Women Any 1 or more of the above	20.6	40.6	12.1	107.047

^a n = 690 (32.6%), ^b n = 1284 (67.3%), * p = .0005

Table 1 displays Past 30-Day Smoking Prevalence Rates for 6 non-cigarette products among
For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

cigarette smokers and non-smokers. As shown, prevalence of smoking 1 or more non-cigarette product was 49.3% for cigarette smokers and 14.9% for non-smokers. Among Black men, prevalence of smoking 1 or more non-cigarette product 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

Table 2. Logistic Regression Predicting Black Adult Smoking of Non-Cigarette Products

Model and Variables Entered	B	Wald	P	OR	95% CI	
STEP 1: DEMOGRAPHIC VARIABLES						
Age	45 and older (REF)					
	18-24	1.997	38.442	.0005	7.37	3.919,13.856
	25-34	1.05	17.546	.0005	2.85	1.46,4.656
	35-44	.705	7.882	.005	2.02	1.237,3.311
Gender	Women (REF)					
	Men	.931	22.023	.0005	2.54	1.720,3.742
Education	Didn't Finish High School (REF)					
	High School Graduate/GED	.051	0.022	.882		
	College and higher	-.227	1.078	.299		
Income	Less than \$10,999 (REF)					
	\$11,000 - \$25,999	.330	1.156	.282		
	\$26,000-\$49,999	.524	3.445	.063		
	\$50,000 and higher	-.189	0.437	.508		
Employment	Employed (REF)					
	Unemployed	.075	0.109	.741		
STEP 2: CIGARETTE SMOKING						
Smoking	Non-Smoker (REF)					
	Smoker	1.16	21.760	.0005	3.19	1.962,5.212
Cigarette Type	Non-Menthol(REF)					
	Menthol	.447	3.469	.063		
	Both	.851	7.166	.007	2.34	1.256, 4.366

REF = Reference group

more likely to smoke non-cigarette products, and the odds of smoking the products increased with decreasing age.

For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

Table 3 displays separate regressions predicting smoking of Blunts and of the cigarillos *Philly* and *Black & Mild*. Age, gender, and higher incomes were predictors of smoking Blunts. The odds of Blunt-smoking were 2.5 times higher for men, and increased as age decreased, with young (ages 18-24) adults 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 & Mild*.

Table 3. Logistic Regressions Predicting Black Adult Smoking of Blunts and of Philly/Black & Mild Cigarillos

		Blunts				Philly/Black & Mild Cigarillos			
Variables Entered		Wald	P	OR	95% CI	Wald	p	OR	95% CI
STEP 1: Demographics									
Age	45 and older (REF)								
	18-24	29.69	.0005	6.25	3.23,12.08	51.69	.0005	15.90	7.48,33.81
	25-34	13.31	.0005	3.07	1.68,5.62	21.33	.0005	4.23	2.29,7.80
	35-44	7.208	.007	2.38	1.26,4.48	14.22	.0005	3.38	1.79,6.36
Gender	Women (REF)								
	Men	14.10	.0005	2.49	1.55,4.02	14.02	.0005	2.57	1.57,4.21
Education	Not HS Grad (REF)								
	HS Grad/GED	0.82	.365			.928	.335		
	College and higher	1.066	.302			.616	.433		
Income	Less than \$10,999(REF)								
	\$11,000 - \$25,999	3.925	.048	2.17	1.01,4.66	.375	.540		
	\$26,000-\$49,999	4.792	.029	2.18	1.09,4.37	.289	.591		
	\$50,000 and higher	0.051	.821			.089	.766		
Employment									
	Employed(REF)								
	Unemployed	0.259	.611			1.29	.257		
STEP 2: Cigarette Smoking									
Smoking	Non-Smoker (REF)								
	Smoker	3.767	.052	1.89	.994,3.59 ^a	19.75	.0005	5.34	2.55,11.18
Type	Non-Menthol(REF)								
	Menthol	0.521	.470			6.72	.013	2.36	1.19,4.66
	Both	0.169	.681			15.42	.005	5.08	2.26,11.43

REF = Reference group; ^a = Not Significant

The separate regressions predicting Cigar-Smoking and Marijuana-Smoking (Table 4) found age, gender, and cigarette smoking to be the predictors of both. Men, young adults, and smokers were 2.5 to 3

For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

times more likely to smoke Standard-size Cigars than their reference groups. For Marijuana-Smoking, men were twice as likely, the youngest age group 6 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 ages 18-24 (OR = 4.7) and 35-44 (OR 4.4) 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 ages 35-44 were 11 times more likely, and menthol smokers (OR = 0.205) were less likely to smoke Kreteks/Cloves.

Table 4. Logistic Regressions Predicting Black Adult Smoking of Cigars and of Marijuana

		Standard-size Cigars				Marijuana			
	Variables Entered	Wald	P	OR	95% CI	Wald	p	OR	95% CI
Age	45 and older (REF)								
	18-24	9.023	.003	2.99	1.46,6.09	30.68	.0005	6.05	3.20,11.45
	25-34	.819	.365			25.30	.0005	4.13	2.38,7.17
	35-44	4.132	.042	1.98	1.03,3.82	6.85	.009	2.18	1.22,3.90
Gender	Women (REF)								
	Men	16.823	.0005	3.08	1.80,5.28	11.51	.001	2.14	1.38,3.32
Education	Not HS Grad (REF)								
	HS Grad/GED	.264	.607			1.03	.310		
	College and higher	.004	.947			.129	.719		
Income	Less than \$10,999 (REF)								
	\$11,000 - \$25,999	.518	.472			1.35	.245		
	\$26,000-\$49,999	2.065	.151			2.14	.143		
	\$50,000 and higher	.473	.492			.048	.826		
Employment	Employed(REF)								
	Unemployed	.032	.858			1.08	.300		
STEP 2: Cigarette Smoking									
Smoking	Non-Smoker (REF)								
	Smoker	6.305	.012	2.54	1.23,5.26	9.42	.002	2.55	1.40,4.64
Type	Non-Menthol(REF)								
	Menthol	.162	.687			3.83	.050	1.76	.999,3.09 ^a
	Both	1.887	.170			2.74	.098		

REF = Reference group; ^a = Not Significant

Table 5. Logistic Regressions Predicting Black Adult Smoking of Bidis and of Kreteks/Cloves

Variables Entered	Bidis				Kreteks/Clove Cigarettes			
	Wald	P	OR	95% CI	Wald	P	OR	95% CI
STEP 1: Demographics								
Age	45 and older (REF)							
	18-24	4.634	.031	4.74	1.15,19.55	0.000	.997	
	25-34	3.256	.071			3.540	.06	5.79 .929,36.04 ^a
	35-44	5.000	.025	4.43	1.20,16.32	7.265	.007	11.09 1.928,63.79
Gender	Women (REF)							
	Men	1.970	.160			0.179	.672	
Education	Not HS Grad (REF)							
	HS Grad/GED	.000	.990			0.033	.855	
	College and higher	.013	.910			1.447	.229	
Income	Less than \$10,999 (REF)							
	\$11,000 - \$25,999	1.044	.307			0.758	.384	
	\$26,000-\$49,999	.119	.731			0.812	.367	
	\$50,000 and higher	.089	.776			0.229	.632	
Employment	Employed(REF)							
	Unemployed	1.719	.190			0.116	.734	
STEP 2: Cigarette Smoking								
Smoking	Non-Smoker (REF)							
	Smoker	2.126	.145			0.000	.996	
Type	Non-Menthol(REF)							
	Menthol	.753	.386			4.365	.037	0.205 .046,.907
	Both	2.341	.126			0.488	.485	

REF = Reference group; ^a = Not Significant

DISCUSSION

There was a high (49.3%) prevalence of polytobacco among Black adult cigarette smokers that held for men (57.3%) and women (40.6%). Substantial smoking of non-cigarette products also was 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 generally were 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

1 contribute to smoking bidis, kreteks, or blunts. Smoking of any non-cigarette product and of each specific
2 product generally was highest among adults ages 18-24 years (ORs = 3 to 15.9) as in prior studies [13-
3 16], and decreased as age increased. The exception was smoking kreteks/cloves; for these, older adults
4 were more likely to be users. Moreover, unlike the well-known relationship between cigarette smoking
5 and low SES[1,3-5], for these non-cigarette products, SES was related only to smoking blunts, with
6 higher incomes a predictor. Type of cigarette smoked contributed to smoking non-cigarette products in
7 general, and to smoking *Phillies/Blacks* specifically, with higher odds for those who smoked both
8 menthol and non-menthol cigarettes, rather than one or the other; menthol smoking generally did not
9 predict use of other products.

10
11
12
13
14
15
16
17
18
19
20
21
22 These findings suggest a problematically high prevalence of polytobacco use among Black
23 smokers that is strongly associated with gender and young-adulthood but not associated with low income,
24 low education, or menthol-smoking. Polytobacco users were mostly young men of varied SES who
25 smoked all types of cigarettes along with non-cigarette products, i.e., a possible pattern of smoking
26 whatever is available. Given that low-SES was not a risk factor for this, polytobacco use might perhaps
27 instead be related to the social risk-factors for cigarette smoking among Blacks that have been identified
28 in prior studies, i.e., racial segregation[27-29] and racial discrimination[30-32]. High levels of residential
29 segregation (with high exposure to targeted tobacco advertising and easy access to single cigarettes in
30 Black neighborhoods), and high levels of (the stress of) racial discrimination might be associated with
31 smoking any cigarette and non-cigarette product available. Studies of the possible role of these factors in
32 polytobacco use among Blacks are needed.

33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48 The 14.9% prevalence of past 30-day smoking of non-cigarette products by non-cigarette smokers
49 also is a concern. Smoking blunts and bidis was not associated with cigarette smoking but was strongly
50 associated with youth. This suggests that smoking blunts and bidis might reflect youthful experimentation
51 [13,15,17], and raises questions about whether young Blacks try these before they try cigarettes[13].
52
53
54
55
56
57
58
59
60 Studies of age of initiating smoking of cigarettes versus blunts and cigarillos among Blacks are needed to
clarify this.

1 This study also found a substantial prevalence of smoking products that are not assessed in most
2 population smoking surveys of adults (e.g., marijuana, cigarillos, blunts). Hence, it would be beneficial
3 for surveillance studies to assess smoking of blunts, bidis, and (in particular) cigarillos such as *Phillies*,
4 *Black & Mild*, and *Swisher Sweets*. Smoking of cigarillos may need to be assessed by brand name
5 because young Blacks often do not categorize them as cigars[18], and hence their reports of cigar use
6 increase significantly when these brand names are included[18]. That these cigarillos are sold individually
7 and come in a variety of flavors (e.g., chocolate, apple, cherry) may contribute to not categorizing them as
8 cigars or as cigarettes. Such assessment will provide a more comprehensive picture of smoking among
9 Black adults, and would match the complexity of recent (2011) assessments of youth smoking that
10 included bidis, kreteks and cigarillos [35].

11 This study has several limitations, including use of self-reports that may be lower than
12 biologically-validated data[25], lack of assessment of some forms of tobacco use (e.g., pipes), and a
13 California sample whose data might not generalize to other states. **In addition, we treated age as a
14 categorical instead of a continuous variable, and this may have limited the sensitivity of analyses. We note
15 however that the age categories used here are similar to those used in prior studies of polytobacco use in
16 which the highest prevalence found was for 18-24 year olds [e.g., 13-16].** Moreover, to decrease the
17 number of consecutive significance tests, potentially-interesting interaction effects (e.g., gender X age,
18 gender X income) were not examined; such effects however generally are not examined in basic,
19 epidemiologic studies of product-use [e.g., 35] and is a limitation of this study and of similar studies.
20 Likewise, because more than 90% of these Black cigarette smokers consumed 10 or fewer cigarettes per
21 day, potential relationships between number of cigarettes smoked and smoking of other products were not
22 examined. In addition, prevalence of smoking the products may have changed since this study. This is
23 particularly the case for kreteks (clove cigarettes) that were banned by the 2009 *Family Smoking
24 Prevention and Tobacco Control Act* [36]. The CDC's 2011 study of youth [35] revealed that youth still
25 smoke kreteks despite the ban, and this suggests that adults also might still smoke them. How youth and
26 adults acquire banned and illegal products is worthy of investigation.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Despite these limitations, this study is the first to highlight the magnitude and complexity of smoking among a random, community sample of Black 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 Black difficulty 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 Black men [7,33]. Similarly, it would be beneficial for healthcare providers to include non-cigarette products such as bidis and blunts in 5A (ask, advise, assess, assist, arrange) assessment of smoking [34] 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 remains unknown. Studies are needed to assess the possibility that hidden polytobacco use might contribute to the relative failure of standard smoking cessation programs with Black smokers[5-6], and research on the possible need for new cessation interventions for polytobacco users is needed as well.

FUNDING

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

Conflicts of interests: The authors have no financial or other conflicts of interests.

Author Contributions

Irma Corral made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Hope Landrine made substantial contributions to 1) study conception and design, acquisition of data, and analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Jukelia Bess made substantial contributions to 1) analysis and interpretation of data; to 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

Denise Adams Simms made substantial contributions to 1) study conception and design, and acquisition of data, 2) drafting the article or revising it critically for important intellectual content; and gave 3) final approval of the version to be published.

REFERENCES

1. Centers for Disease Control and Prevention. Any tobacco use in 13 states B Behavioral Risk Factor Surveillance System, 2008. *MMWR*. 2010; 59(30): 946-950.
2. Bombard JM, Pederson LL, Nelson DE, Malarcher AM. Are smokers only using cigarettes? *Addict Beh*. 2007; 32:2411-2419.
3. 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(11):e99-e100.
4. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School StudentsB United States, 2000-2009. *MMWR*. 2010; 59(33):1063-8.
5. Fagan P, Moolchan ER, Lawrence D, Fernander A, Ponder PK. Identifying health disparities across the tobacco continuum. *Addiction*. 2007; 102 (Suppl.2): 5-29.
6. 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(4):699-706.
7. 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(4): 333-342.
8. Delneveo CD, Hrywna M. The relationship of cigars, marijuana, and blunts to adolescent bidi use. *Public Health Reports*. 2006; 121(5): 603-608.
9. Malson JL, Lee EM, Murty R, Moolchan ET, Pickworth WB. Clove Cigarette Smoking: Biochemical, Physiological, and Subjective Effects. *Pharm., Biochem. Beh*. 2003;74:739B745
10. Watson CH, Polzin GM, Calafat AM, et al. Determination of the Tar, Nicotine, and Carbon Monoxide Yields in the Smoke of Bidi Cigarettes. *Nic. Tob. Research*. 2003;5:747B753.
11. Ganesh B, Sushama S, Monika S, Suvarna P. A case-control study of risk factors of lung cancer in Mumbai, India. *Asian Pac J Cancer Prev*. 2011; 12(2):357-362.
12. 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; 102:460-67.

- 1 13. Delnevo CD, Pevzner ES, Myrwna M, Lewis MJ. Bidi cigarette use among young adults in 15
2 states. *Prev. Med.* 2004; 39: 207-211.
- 3
4
5 14. Vander Weg MW, Peterson, AL, Ebbert JO, et al. Prevalence of alternative forms of tobacco
6 use in a population of young adult military recruits. *Addict Behav.* 2008; 33: 69-82.
- 7
8
9
10 15. Sinclair CF, Foushee HR, Pevear JS et al. Patterns of blunt use among young adult African
11 American men. *Am J Prev Med.* 2012; 42(1): 61-64
- 12
13
14 16. Jolly DH. Exploring the use of little cigars by students at a historically Black university. *Prev*
15
16
17
18
19
20 17. Page JB, Evans S. Cigars, cigarillos and youth: Emerging patterns and subcultural
21 complexities. *J Ethn Subst Abuse.* 2003; 2(4): 63-76.
- 22
23
24 18. Yerger VB, Pearson C, Malone R. When is a cigar not a cigar? *Am J Public Health.*
25
26
27
28
29 19. Blumberg SJ, Luke JV, Cynamon ML. Telephone coverage and health survey estimates:
30 Evaluating the need for concern about wireless substitution. *Am J Public Health.* 2006;96: 926-31.
- 31
32
33 20. Link MW, Mokdad AH, Stackhouse HF, et al. Race, ethnicity, and linguistic isolation as
34 determinants of participation in public health surveillance surveys. *Prev Chronic Dis.* 2006; 3:1-12.
- 35
36
37
38 21. Satia JA, Galanko JA, Rimer BK. Methods and strategies to recruit African-Americans into
39 cancer prevention surveillance studies. *Cancer Epi Bio Prev.* 2005; 14(3):718-721.
- 40
41
42 22. Carroll, JK, Yancey, AK, Spring, B, et al. What are successful recruitment and retention
43 strategies for underserved populations? *Translational Behav Med.* 2011; 234-251.
- 44
45
46
47 23. Cabral DN, Napoles-Springer AM, Miike R, et al. Population- and community-based
48 recruitment of African Americans and Latinos. *Am J Epi.* 2003; 158: 272-279.
- 49
50
51
52 24. Pichon LC, Corral I, Landrine H., et al. Sun protection behaviors among African
53 Americans. *Am J Prev Med.* 2010; 38(3): 288-295.
- 54
55
56
57 25. Fisher MA, Taylor GW, Shelton BJ, Debanne S. Age and race/ethnicity-gender
58 predictors of denying smoking, United States. *J Health Care Poor Underserv.* 2008; 19: 75-89.
- 59
60

- 1 26. Beebe TJ, McRae JA, Harrison PA, et al. Mail surveys result in more reports of substance use.
2
3 *J Clinical Epi.* 2005; 58: 421-424.
4
- 5 27. Liao Y, Tucker P, Okoro CA, et al. REACH 2010 Surveillance for Health Status in Minority
6
7 Communities. *MMWR Surveillance Summaries.* 2004; 53:1-36.
8
- 9 28. Landrine H, Klonoff EA. Racial segregation and cigarette smoking among Blacks. *J Health*
10
11 *Psych.* 2000; 5(2): 211-219.
12
- 13 29. Datta GD, Subramanian SV, Colditz GA, et al. Individual, neighborhood, and state-level
14
15 predictors of smoking among US Black women. *Soc Sci & Medicine.* 2006; 63, 1034-1044.
16
- 17 30. Borrell LN, Diez Roux AV, Jacobs DR, et al. Perceived racial/ethnic discrimination, smoking,
18
19 and alcohol consumption in the Multi-Ethnic Study of Atherosclerosis (MESA). *Prev. Med.* 2010; 51:
20
21 307-312.
22
- 23 31. Shariff-Marco S, Klassen AC, Bowie JV. Racial/ethnic differences in self-reported racism and
24
25 its association with cancer-related health behaviors. *Am J Public Health.* 2010;100:364-74.
26
- 27 32. Corral I, Landrine H. Racial Discrimination and Health-Promoting vs. Damaging Behaviors
28
29 among African-American Adults. *J Health Psych.* 2012; 17: 1176-1182.
30
- 31 33. Elk R, Landrine H. *Cancer Disparities.* New York, NY: Springer; 2012.
32
- 33 34. Weglicki LS. Tobacco use assessment: What exactly is your patient using and why is it
34
35 important to know? *Ethn Dis.* 2008; 18(3 Suppl 3): S3-6.
36
- 37 35. Centers for Disease Control and Prevention. Tobacco Use Among Middle and High School
38
39 StudentsB United States, 2011. *MMWR.* 2012; 61(31):581-585.
40
- 41 36. See <http://www.fda.gov/TobaccoProducts/GuidanceComplianceRegulatoryInformation>.
42
43
44
45
46
47
- 48 37. Hashibe M, Straif K, Tashkin DP, et al. Epidemiologic review of marijuana use and cancer
49
50 risk. 2005. *Alcohol*; 35(3): 265-275.
51
52
53
54
55
56
57
58
59
60

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any pre-specified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(a) Describe all statistical methods , including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data	15*	Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.