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Gender and racial differences in smoking of long/ultra-long and king size cigarettes among U.S. adult smokers, NHANES 1999–2012

Israel T. Agaku[a,*], Constantine I. Vardavas[a], Olalekan A. Ayo-Yusuf[a,b], Hillel R. Alpert[a], Gregory N. Connolly[a]

[a] Center for Global Tobacco Control, Department of Social and Behavioral Sciences, Harvard School of Public Health, USA
[b] Office of the Dean/Director, School of Oral Health Sciences, University of Limpopo, MEDUNSA Campus, Pretoria, South Africa

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ABSTRACT

Background: Cigarette rod length as a design feature may play a specific role in harm perception and tobacco use. Internal tobacco industry documents have shown targeting of females with long/ultra-long cigarettes. This study assessed trends and differences in smoking of long/ultra-long cigarettes among U.S. smokers aged ≥20 years during 1999 through 2012.

Methods: Data were obtained from the 1999/2000 through 2011/2012 National Health and Nutrition Examination Survey. The proportion of current smokers who reported using long/ultra-long cigarettes during each survey year was calculated and compared using χ^2 statistics. Linear and quadratic trends during 1999 through 2012 were assessed using binary logistic regression ($p < 0.05$). Multi-variable analyses were performed to assess current disparities in smoking of long/ultra-long cigarettes.

Results: Despite overall declines in current smoking of long/ultra-long cigarettes during the 1999 through 2012 period ($p < 0.001$ for both linear and quadratic trends), the proportion of smokers of long/ultra-long brands increased in recent years, with over a third (38.7%) of current smokers reporting smoking of long/ultra-long cigarettes during 2011/2012. Current smokers of long/ultra-long cigarettes were more likely to be female compared to males (*a*OR = 3.09; 95%CI: 2.09–4.58), of black race compared to whites (*a*OR = 2.07; 95%CI: 1.30–3.28), or aged 45–64, or ≥65 years (*a*OR = 2.39 and 5.27, respectively), compared to 18–24 year olds.

Conclusions: Specific gender, age and race/ethnic characteristics of smokers of long/ultra-long cigarettes were noted, hence potentially contributing to the widening of health disparities. Cigarette rod length should be considered an important aspect of cigarette engineering/design in regulatory efforts to reduce the burden of tobacco-related disease.

1. Introduction

The initiation and continuation of tobacco use is driven not only by the pharmacologic addictiveness of tobacco products (i.e., abuse liability), but also by product design features which may increase their attractiveness to consumers and potential consumers (i.e., product appeal). The World Health Organization's (WHO) Framework Convention on Tobacco Control Article 11 calls on member nations to ensure that no tobacco product is promoted by means that are misleading, or likely to create an erroneous impression about its health effects or relative harm (World Health Organization, 2003). Consequently, the use of descriptors such as "light," "low," "mild," or other similar labels on tobacco products has been banned in the U.S., the European Union, as well as several low and middle income countries, including South Africa, Seychelles, Togo, India, Nepal and Philippines (Centers for Disease Control and Prevention (CDC), 2010; European Commission, 2013; Campaign for Tobacco-Free Kids, 2013).

As in several other countries (Euromonitor International, 2013), cigarettes available in the U.S. are categorized into four lengths: regular (68–72 mm); King (79–88 mm); Long (94–101 mm); and ultra-long (110–121 mm), with regular and ultra-long brands accounting for just small segments of the total U.S. domestic market share (3% and 2% respectively in 2011; Federal Trade Commission (FTC), 2013). Although King size cigarettes have dominated the U.S. cigarette market (59% of the total market shares in 2011), long brands have seen a growth in total domestic market shares in recent years (from 30% in 2008 to 37% in 2011; FTC, 2013). Similar upward trends in market shares for long brands have also been reported in several other countries during 2008–2012, including Georgia (2.6%–9.5%), Egypt (8.5%–12.5%), Russia (9.7%–13.2%), Hungary (12.0%–21.0%), and Croatia (13.2%–23.8%). In addition,

* Corresponding author. Tel.: +1 770 728 3220.
E-mail address: iagaku@post.harvard.edu (I.T. Agaku).

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during 2012, long brands held a relatively large percentage of the cigarette market in the United Kingdom (22.3%), Turkey (27%), South Korea (34%), and Romania (35%) (Euromonitor International, 2013). It is interesting to note the emergence of long and slim design features in novel products such as electronic cigarettes.

These market shifts in favor of long brands in several countries around the world may provide some insight into consumer behavior at a population level, and further highlight the need for more research on risk perceptions and health communication. Previous research has shown that esthetic features of cigarettes including stick color, length, and branding design elements such as patterns and logos may be associated with increased appeal and altered risk perception among smokers (Borland and Savvas, 2013; Kotnowski and Hammond, 2013; Mutti et al., 2011; Ford et al., 2013a). In addition, internal tobacco industry documents have shown that long/ultra-long cigarettes were particularly attractive among certain population subgroups based on the perceptions that such longer brands were more sophisticated and modern products with a particular appeal to limited typological groups such as women, and people of a higher status, and were designed especially to be used in social situations where added length would be fully appreciated both in terms of extended enjoyment and the added status value (Carpenter et al., 2005a, 2007).

A closer examination of cigarette design characteristics and their effect on product appeal and smoking susceptibility is important, given the enormous health and economic burden of smoking in the U.S. (CDC, 2008). Furthermore, since targeted tobacco product marketing may result in disparities in tobacco use and its aftermaths, an assessment of demographic differences in receptivity to tobacco marketing may help in formulating tailored policies to reduce such disparities. In addition, more information on cigarette design features in the U.S. is warranted and timely given that product standardization is starting to appear on the international tobacco control agenda, e.g., in Australia, as part of the plain packaging legislation, and in the European Union, as envisaged in the European Commission's draft Tobacco Products Directive (Australian Government, 2013; European Commission, 2013).

While several studies have assessed design features such as packaging, "light cigarettes," flavors and other smoke-masking design features (Ford et al., 2013a; Behm et al., 2013; Caruso and O'Connor, 2012; Carpenter et al., 2005b; Kennedy et al., 2013), little population-based information exists on cigarette rod length as a design characteristic. To fill this gap in knowledge, this study assessed trends and correlates in current smoking of regular, king size, and long/ultra-long cigarettes among U.S. adults aged ≥20 years during 1999 through 2012 using nationally representative data from the National Health and Nutrition Examination Survey (NHANES).

2. Methods

2.1. Sources of data

NHANES is a household interview and examination survey that uses a complex multi-stage probability sampling design to select participants from the non-institutionalized U.S. population (CDC, 1999). We analyzed seven consecutive waves of the NHANES, with overall response rates (%) and sample sizes (n) for the interviewed sample by survey year as follows: 1999/2000 (82.0%; n = 4880), 2001/2002 (84.0%; n = 5411); 2003/2004 (79.0%; n = 5041); 2005/2006 (80.5%; n = 4979); 2007/2008 (78.4%; n = 11,870); 2009/2010 (79.4%; n = 6218) and 2011/2012 (72.6%; n = 9756).

2.2. Measures

2.2.1. Current cigarette smoking. Current cigarette smokers were respondents who had smoked ≥100 cigarettes during their lifetimes and, at the time of interview, reported smoking every day or on some days.

2.2.2. Cigarette rod length. Cigarette brand in NHANES was assessed among respondents aged ≥20 years, and was documented after having being seen by the interviewer, or if not, selected from the brand list by the respondent. Universal Product Code was used for identifying cigarettes with a single brand name and possible multiple rod sizes. Cigarette rod length was measured in the following four categories: "Regular (68–72 mm)"; "King (79–88 mm)"; "Long (94–101 mm)"; or "Ultra long (110–121 mm)". Because of the small sample sizes for ultra-long cigarettes during each survey year, long and ultra-long rod lengths were collapsed together as a category for all analyses.

2.2.3. Demographic characteristics. Because the tobacco industry has been known to target certain population niches by sex, age, race, and several other socio-demographic characteristics (Cook et al., 2003; Carpenter et al., 2005a, 2007), we measured trends across several populations sub-groups, by sex (male or female), age (≤24; 25–44; 45–64; or ≥65 years), race/ethnicity (Hispanics; or non-Hispanic: whites, blacks, or other race), marital status (married or living with partner; widowed, divorced or separated; or never married), educational level (<9 grade; 9–11 grade; high school graduate/General Educational Development Certificate; or >high school), and body mass index (underweight: <18.5; normal weight: 18.5–24.9; overweight: 25–29.9; or obese: ≥30). Body mass index was included to assess the relationship between respondents' weight and smoking of long/ultra-long cigarettes in particular.

2.3. Data analysis

The primary outcome of interest was cigarette rod length smoked. The denominator for all analyses across all survey years was current cigarette smokers aged ≥20 years. Prevalence estimates by cigarette rod length across survey years were calculated overall as well as by sex, race/ethnicity, age, educational level, marital status, and body mass index. Prevalence estimates with relative standard errors ≥30% were considered statistically unreliable and not presented. Chi-squared tests were used to assess for within-group differences.

Results were assessed for the presence of linear trends ($p < 0.05$). A linear trend indicates an overall change from the beginning to the end of the study period but does not necessarily indicate a constant rate of change. If a linear trend was detected, data were also assessed for the presence of a quadratic trend. Quadratic trends indicate a significant but nonlinear trend in the data over time. When a significant quadratic trend accompanied a significant linear trend, the data demonstrated some nonlinear variation (e.g., leveling off or change in direction) in addition to a linear trend. Linear and quadratic trends during 1999–2012 were assessed by means of binary logistic regression, controlling for sex, race/ethnicity, age, educational level, marital status, and body mass index to adjust for any changes in the population composition during the study period. In addition, the annual percentage change (APC) in proportion of smokers for each cigarette rod length category during 1999–2012 was calculated using Join Point regression.

To further assess the correlates of smoking king size and long/ultra-long cigarettes among current smokers, multi-variable logistic regression models were fitted, assessing for sex, marital status, age, race/ethnicity, school level, and body mass index ($p < 0.05$). All data were weighted to account for the complex survey