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Poly-tobacco use among adults in 44 countries during 2008–2012: Evidence for an integrative and comprehensive approach in tobacco control

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ABSTRACT

Introduction: The concurrent use of multiple tobacco products (i.e., poly-tobacco use) might hinder efforts to reduce overall tobacco use, particularly considering that use of some non-cigarette tobacco products may be popular in some regions due to social, cultural, or economic reasons. This study assessed poly-tobacco use patterns among persons aged ≥15 years old from 44 countries.
Methods: Data from 44 countries in all six World Health Organization regions were obtained from the 2008 to 2012 Global Adult Tobacco Surveys (n = 19 countries), and the Special Eurobarometer 385 (77.1) survey, 2012 (n = 25 countries). Correlates of poly-tobacco use were assessed using multivariate logistic regression analyses ($p < 0.05$).
Results: Overall prevalence of poly-tobacco use ranged from 0.8% (Mexico) to 11.9% (Denmark). In 28 countries, 20% or more of current smokers of manufactured cigarettes concurrently used at least one other tobacco product and this proportion was highest in India (66.2%) and lowest in Argentina (4.4%). After adjusting for other factors, the likelihood of being a poly-tobacco user among all respondents was lower among females (*a*OR = 0.09; 95% CI: 0.08–0.11), and among respondents from upper-middle-income (*a*OR = 0.53, 95% CI: 0.43–0.66), and lower-middle-income countries (*a*OR = 0.64; 95% CI: 0.51–0.81) compared to high-income countries. Increased likelihood of poly-tobacco use was observed among respondents from the South-East Asian region compared to those from the European region (*a*OR = 1.58, 95% CI: 1.35–1.85), as well as among respondents aged ≥65 years (*a*OR = 2.10; 95% CI: 1.73–2.54), compared to those aged <25 years.
Conclusions: The pattern of tobacco use varied widely, underscoring the need for intensified efforts towards implementing policies that address all tobacco products, not only manufactured cigarettes.

1. Introduction

Manufactured cigarettes are the most commonly used tobacco products in most parts of the world. However, cultural, social and economic factors may influence popularity of other tobacco products in certain regions, as is evident in the popularity of kreteks in Indonesia, hand-rolled cigarettes in Europe, water-pipes in North Africa, Middle East and parts of Asia, and bidis in South Asia (Eriksen et al., 2012; European Commision, 2012; Giovino et al., 2012; Maziak et al., 2013; Morton et al., 2013; Palipudi et al., 2012; Prignot et al., 2008). Meanwhile, smokeless tobacco products, such as snuff and chewing tobacco are also showing increasing popularity outside South Asia where they are traditionally used (Eriksen et al., 2012; Maziak et al., 2013; Prignot et al., 2008).

Tobacco products other than factory manufactured cigarettes may be used by smokers as a strategy to minimize the cost of smoking (Licht et al., 2011), or to circumvent smoking bans in public places in the case of smokeless tobacco (and recently in some places – electronic cigarettes; McClave-Regan and Berkowitz, 2011). The

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concurrent use of multiple tobacco products might hinder efforts to reduce overall tobacco use, especially considering that most interventions and tobacco control policies in several regions of the world tend to focus on a specific tobacco product – usually manufactured cigarettes. Understanding local patterns in the use of different tobacco products, as well as regional or cross-country variations in their use may equip policy makers with a more nuanced knowledge of the health and economic burden arising from predominant tobacco use patterns. Such information may also enhance regional integration of tobacco control policies to strengthen their impact across countries and within regions.

The proliferation of newer tobacco products and brands in several countries, coupled with the increasing expenditures on global marketing of tobacco products (e.g., through the internet; Federal Trade Commission; FTC, 2013a,b), may be contributors to poly-tobacco use. Notably however, it is difficult to compare poly-tobacco use patterns between different studies since differences in the number or types of tobacco products assessed may preclude comparability of estimates (Klesges et al., 2011). Thus, to provide a global overview of poly-tobacco use among adults and the implications for tobacco control policy, surveillance and clinical practice, we analyzed data for 44 countries using the 2008–2012 Global Adult Tobacco Survey (GATS) (n = 19 countries) and the Special Eurobarometer 385 (77.1) survey, 2012, (n = 25 countries).

2. Methods

2.1. Data source

Data were obtained from the 2008 to 2012 GATS, and the Special Eurobarometer 385 (77.1). As all analyses were performed on de-identified publicly available data, this secondary analysis was deemed as exempt from the Harvard School of Public Health, Institutional Review Board (IRB), with IRB protocol number 14-0346.

2.1.1. GATS. Respondents aged ≥15 years were sampled using a multistage cluster sample design, with households selected proportional to population size. During 2008–2012, GATS data were collected from 19 countries, located in all six World Health Organization (WHO) regions: Europe region (n = 5 countries: Romania, Ukraine, Turkey, Russian Federation, and Poland); Western Pacific region (n = 4 countries: China, Philippines, Vietnam, and Malaysia); Region of the Americas (n = 4 countries: Mexico, Uruguay, Argentina, and Brazil); South-East Asia Region (n = 4 countries: Thailand, India, Bangladesh, and Indonesia); Eastern Mediterranean region (n = 1 country: Egypt); and Africa Region (n = 1 country: Nigeria).

2.1.2. The Special Eurobarometer 385 (77.1). Respondents aged ≥15 years in the European Union (EU) member countries were sampled from households with probability proportional to population size and to population density, during February 25 and March 12, 2012.

The Special Eurobarometer 385 (77.1) data were analyzed for 25 EU member countries: France, Belgium, Austria, Germany, The Netherlands, Luxembourg, Greece, Italy, Malta, Portugal, Slovenia, Spain, The Republic of Cyprus, Denmark, Slovakia, Czech Republic, Ireland, United Kingdom, Latvia, Lithuania, Finland, Sweden, Estonia, Hungary, and Bulgaria.

2.2. Measures

2.2.1. Socio-demographic characteristics. Socio-demographic characteristics assessed included sex (male or female), age (15 to <25; 25 to <45; 45 to <65; or ≥65), residence (rural or urban), gross national income based on the 2012 World Bank classification (high-income, upper-middle income, lower-middle-income; or low-income countries), WHO geographic region and survey year.

2.2.2. Tobacco products-types. The following tobacco products were assessed depending on the availability in each country's survey: manufactured cigarettes; hand-rolled cigarettes; cigars or cigarillos; water-pipes; pipes; smokeless tobacco products; bidis; clove cigarettes/kreteks; electronic cigarettes and other non-combustible cigarettes; cigarettes with cardboard holders (i.e., cardboard tube-tipped cigarettes); as well as other tobacco products not otherwise specified.

All 44 countries collected data on the following four tobacco products: manufactured cigarettes, hand-rolled cigarettes, cigars/cigarillos, and water-pipes. Other products assessed included pipes (n = 43 countries excluding India); smokeless tobacco products (n = 43 countries excluding Turkey); bidis (n = 4 countries: India, Malaysia, Brazil, and Bangladesh); clove cigarettes or kreteks (n = 4 countries: Indonesia, Brazil, Philippines and Malaysia); electronic cigarettes and other non-combustible cigarettes (n = 25 countries of the Eurobarometer 385 (77.1); these products were not assessed in GATS); cardboard tube-tipped cigarettes (n = 1 country, the Russian Federation).

2.2.3. Tobacco products-current use

2.2.3.1. GATS. Current tobacco users were defined as respondents who used the specified tobacco products daily or on some days. For all tobacco products except smokeless tobacco, daily and some days use was assessed with the questions: "On average, how many [of specified product] do you currently smoke each day?", "On average, how many [of specified product] do you currently smoke each week?"

Current use of smokeless tobacco was defined as a response of "daily" or "less than daily" to the question: "Do you currently use smokeless tobacco on a daily basis, less than daily, or not at all?"

2.2.3.2. Eurobarometer 385 (77.1). Current users of manufactured cigarettes, hand-rolled cigarettes, cigars and pipes were defined as respondents who indicated a response of "everyday", "weekly" or "monthly" to the question: "How often do you use the following tobacco products". Respondents who had never used the specified product, or had used it only "once or twice", as well as those who indicated that they "used to smoke but had stopped" were categorized as current non-smokers.

Current use of water-pipes, electronic cigarettes or other non-combustible cigarettes was defined as self-reported use of the respective products "regularly" or "occasionally". Respondents who had never used the specified product or had used it only "once or twice" were categorized as current non-users.

Current use of smokeless tobacco was defined as self-reported use of oral tobacco (snus), chewing or nasal tobacco (snuff) "regularly" or "occasionally". Respondents who indicated they had used smokeless tobacco only "once or twice" were categorized as current non-users.

2.3. Data analyses

2.3.1. Analytical case definitions. Current use of any tobacco product was defined as current use of at least one tobacco product among all those assessed in each country's survey. Poly-tobacco use was defined as use of two or more tobacco products concurrently.

2.3.2. Statistical analyses. Nationally representative estimates of current use of each tobacco product and poly-tobacco use were calculated using percentages and 95% confidence intervals, and compared using chi-squared statistics. To assess for correlates of poly-tobacco use among all respondents, a pooled multivariate logistic regression model was fitted, assessing for sex, age, residence, gross national income, WHO region, and survey year (p < 0.05). Because of the marked differences in sample sizes between the Eurobarometer and GATS (much larger national samples in GATS), as well as the fact that there were GATS data for at least one country in each WHO region, the pooled multivariate analyses were restricted to the 19 countries for which GATS data were available. All data were weighted and analyzed with Stata 11 (StataCorp 2009, TX).

3. Results

The proportion of female respondents in all countries ranged from 48.3% (India) to 55.7% (Estonia). The overall response rate for the Global Adult Tobacco Survey ranged from 65.1% (Poland) to 97.3% (Egypt).

3.1. Current Use of different tobacco products

3.1.1. Any tobacco product. Current use of any tobacco product was lowest in Nigeria (5.6%) and highest in Bangladesh (43.2%).

3.1.2. Manufactured cigarettes. The overall prevalence of current smoking of manufactured cigarettes was lowest in Indonesia (2.2%), and highest in the Russian Federation (38.5%) (Table 1). Sex-stratified estimates of current smoking of manufactured cigarettes are shown in Tables 2 and 3. Female smoking of manufactured cigarettes was relatively low in several low and middle income countries, as shown by a prevalence of 0.1% in Indonesia, and 0.2% in each of Bangladesh, Egypt and Nigeria; in contrast to several European countries such as Ireland (28.9%), Greece (30.1%), and Bulgaria (30.4% Table 3).

3.1.3. Smokeless tobacco products. Overall prevalence of current smokeless tobacco use ranged from virtually no current user in