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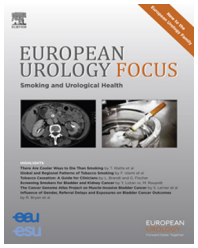

Review – Epidemiology

Global and Regional Patterns of Tobacco Smoking and Tobacco Control Policies

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Abstract

Context: Tobacco smoking is a major worldwide cause of morbidity and mortality from various diseases, including urologic diseases.
Objective: We reviewed, at global and regional levels, the prevalence and trends of tobacco smoking and legislative and regulatory efforts around tobacco control. We also provided information about electronic cigarette (e-cigarette) use.
Evidence acquisition: We used several sources to present the most up-to-date information from national surveys, including the Global Adult Tobacco Survey, the Global Tobacco Control Report, and the Global Youth Tobacco Survey.
Evidence synthesis: Smoking prevalence has been decreasing globally, although trends in smoking vary substantially across countries and by gender. Among men, smoking prevalence in most high-income countries started to decrease in the mid-1990s, followed after a few decades by generally smaller decreases in some low- and middle-income countries (LMICs). However, there has been no change, or there has even been an increase, in smoking prevalence in many other LMICs. Countries with the highest male smoking prevalence are located in East Asia, Southeast Asia, and Eastern Europe. Similar to men, smoking prevalence for women has been decreasing in most high-income countries and some LMICs, although the decrease began later and was slower than that for men. Except in a few countries, smoking is much less common for women than for men. Most countries with the highest smoking prevalence in women are in Europe. Countries that have implemented the best practices for tobacco control, including monitoring, smoke-free policies, cessation programs, health warnings, advertising bans, and taxation, have been able to reduce smoking rates and related harms. E-cigarette use has rapidly increased since its introduction to the market.
Conclusions: Health care providers should advise smoking patients about quitting smoking. Countries must improve the implementation and enforcement of tobacco control policies. Particular attention should be paid to preventing an increase in smoking among women in LMICs.
Patient summary: We reviewed smoking prevalence and tobacco control policies in various regions. Countries with more effective tobacco control programs have seen higher reductions in smoking prevalence and, consequently, in smoking-related mortality. Because both longer duration and higher intensity of smoking (amount of tobacco smoked per day) are associated with an increased risk of tobacco-related diseases, smokers should quit smoking as soon as possible.
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1. Introduction

The epidemic of tobacco-related diseases is the first worldwide epidemic created by humans. Tobacco use killed 100 million people globally in the 20th century and will kill 1 billion in the 21st century if current patterns persist [1,2]. Tobacco use is also a burden on global economic development. In the United States alone, the estimated economic cost related to tobacco consumption is $289 billion per year [3].

Tobacco use is a known risk factor of cancer and other diseases in a number of organs. Although tobacco use has some short-term health effects, tobacco-related mortality usually peaks a few decades after smoking [4]. Therefore, knowing patterns of tobacco smoking not only helps to understand the current epidemiology of smoking-related diseases but also can provide valuable information about the epidemiology of these diseases in the future.

In this review, we provide information on prevalence and trends of tobacco smoking at global and regional levels. We also briefly review the use of electronic cigarettes (e-cigarettes), which has been rapidly growing. Finally, we discuss legislative and regulatory efforts around tobacco control and their effects on smoking patterns.

2. Evidence acquisition

We used several sources of smoking data to present the most up-to-date information from national surveys. For current regular smoking, we used the Global Adult Tobacco Survey (GATS), an international survey using the same protocol across the surveys, as the main source of national data [5]. When data for specific countries were not available from this survey, we used the World Health Organization (WHO) Report on the Global Tobacco Epidemic 2013 (also known as the Global Tobacco Control Report [GTCR]), which collected data (up to 2012) from various sources [6]. We also used a subnational survey [7] and a few national surveys [8–16] for more recent smoking data that were not included in GATS or the GTCR, as well as for information on e-cigarettes [8,17–23]. For daily smoking data, we used the estimated prevalence presented in a publication from the Institute for Health Metrics and Evaluation (University of Washington, Seattle, WA, USA) [24]. Although the main focus of this review is smoking in adults, we used data from the Global Youth Tobacco Survey, an international survey on youth tobacco use [5,25], to show data on youth tobacco use. We also briefly discuss smokeless tobacco use even though its associations with urologic diseases are not well established, because it is the most common form of tobacco use in certain countries.

Throughout this article, *tobacco smoking* refers to smoking of any tobacco product (cigarette, cigar, cigarillo, hookah, bidi, or any other product), unless stated otherwise. To combine data and show trends of smoking prevalence from 1980 to 2012 and current coverage of tobacco policies by continents, we used the United Nations (UN) list of countries in each continent [26]. This list is slightly different from some commonly used lists: Armenia, Azerbaijan, Cyprus, Georgia, and Turkey are considered West Asian rather than European countries. Nevertheless, we used this official UN list, and this difference did not substantially change the trends/coverages in continents. The only exception to using the UN list was when we showed smoking rates for individual countries. From the above West Asian countries in the UN list, smoking rates were shown for Cyprus and Turkey, both of which are listed among European countries in Table 1. We used the World Bank databases to obtain countries' populations and income groups [27]. Income groups were defined by annual gross national income per capita as low, $\leq$$1045; lower middle, $1046–$4125; upper middle, $4126–$12 745; and high, $\geq$$12 746.

3. Evidence synthesis

3.1. Global patterns of tobacco smoking

Recent estimates suggest that in 2012, 928 million men and 207 million women were current smokers of any tobacco product globally [28], and the majority (807 million men and 160 million women) were daily smokers [24]. Most countries with the highest male smoking prevalence are in East Asia, Southeast Asia, and Eastern Europe. The highest female smoking rates are mostly in European countries.

3.1.1. Tobacco epidemic

Trends in smoking prevalence in most high-income countries have followed a pattern that is commonly termed the *tobacco epidemic* or the *cigarette epidemic* [4,29]. In this model, smoking prevalence first increases among men, followed by an increase in women. Smoking-related cancer mortality starts to increase substantially after approximately three to five decades (Fig. 1) [4,30].

The estimated age-standardized smoking prevalence in men and women has been decreasing on all continents (Fig. 2). From 1980 to 2012, smoking rates in both men and women substantially decreased in Oceania and the Americas, chiefly in New Zealand, Australia, and North America. In Europe, although male smoking has also substantially decreased, female smoking has started to show a modest decrease only recently. In Asia, male smoking rates were increasing in the 1980s and started to decrease in the mid-1990s; nevertheless, the smoking prevalence in men was $>$35% in 2012, the highest of all continents. The smoking prevalence in African men has been lower than that of men in other continents. Smoking by women in Africa and Asia has been traditionally low (chiefly $<$5%) and changed little from 1980 to 2012. As male smoking in many African countries and female smoking in many low- and middle-income countries (LMICs) have not yet followed the tobacco epidemic pattern, a major priority for health authorities in LMICs must be to prevent a surge in smoking similar to what happened in high-income countries.

3.1.2. Duration and intensity of smoking

Increased harm from smoking is associated with longer duration of smoking, higher smoking intensity (the average

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