

Research Article

# Waterpipe Smoking: Challenges and Opportunities for More Effective Regulations

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## Abstract

Waterpipe smoking (WPS), also known as hookah, is a popular social phenomenon among youth and young adults worldwide. They come in various sizes, shapes, and styles, with the highest prevalence observed in the Middle East and North Africa. Several factors contribute to their popularity, including appealing flavors, perceived accessibility, affordability, as well as the fact that smoking bars are underregulated in many countries. Although there has been a decrease in tobacco use overall because of global efforts, waterpipe smoking has become more common over time, particularly in Eastern Mediterranean countries. This is also fueled by the misconception by tobacco companies that these products are less harmful than cigarettes. This perspective review will focus on the current epidemiological data on waterpipe smoking, the impact of waterpipe smoking, the challenges of measuring waterpipe prevalence, and put forward recommendations to strengthen waterpipe smoking regulations.

## Keywords

Waterpipe, Smoking, Regulation, Social Phenomenon, Prevalence

## 1. Introduction

Waterpipe smoking (WPS) is a growing global social phenomenon, particularly among youth and young adults [1, 2]. It is also known as hookah, narghile, argileh, shisha, hubble-bubble, goza, borry, qaylan, chica, and Mada'a [3]. Waterpipes come in different sizes, shapes, and styles. It varies from traditional composting cigarette smoking in that it is vaporized for smoking [1]. The prevalence of waterpipe smoking varies across and within nations with highest prevalence observed among Middle Eastern and North African nations. Multiple factors have contributed to its growing popularity among younger generation including appealing flavors and designs, perceived accessibility, affordability, and social acceptance [1, 4]. The false belief that using a waterpipe is less harmful than conventional cigarette smoking also

contributes to the spread of this practice [5]. Additionally, smoking bars are not well-regulated, and they frequently advertise themselves as a social, enjoyable, and relaxing environment for young adults [6].

### 1.1. Types of Waterpipe

Waterpipes are classified into two categories: classic compostable waterpipes and non-compostable electronic waterpipes Figure 1. The traditional compostable waterpipes, traditionally used in the Middle East, consist of a base, stem, and bowl. The base contains a smoke chamber and a purge valve, while the stem connects the base to the bowl. The bowl holds tobacco and charcoal, and when smoked, smoke is

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emitted [7]. Electronic waterpipes, on the other hand are battery-powered devices that use electrically heated e-liquid [8]. When a smoker inhales, a pressure sensor activates heating coils, atomizing the e-liquid [8]. The aerosol is drawn into the water by the stem, carried up into the air pocket above the water, and inhaled through a hose. Electronic waterpipes

come in various flavors and nicotine-free options. Electronic nicotine delivery systems (ENDS) are battery-powered vaping devices that heat e-liquid, offering various flavors and nicotine levels. They differ from electronic waterpipes, which use a water pipe and cool, and use different ingredients and flavors. Both devices have variable nicotine levels [2, 9].



**Figure 1.** Traditional compostable waterpipe and electronic waterpipe.

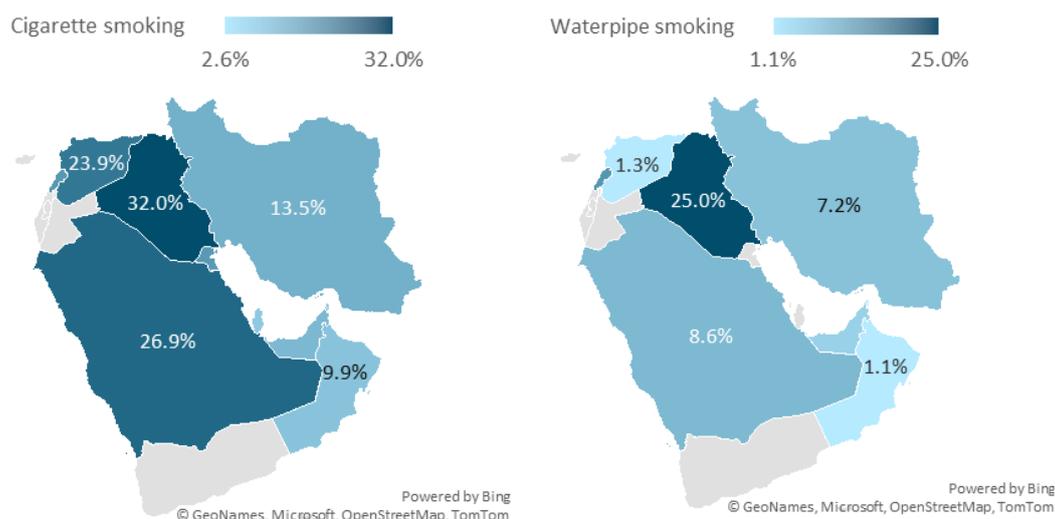
## 1.2. Epidemiological Figure

Although the prevalence of waterpipe smoking varies across and within nations, methods of capturing it are inconsistent and sometimes obtained from subnational surveys [1, 4]. Lebanon-based studies looked at the prevalence of waterpipe smoking among intermediate and secondary school pupils [4]. Results showed that waterpipe use was ten times more prevalent than cigarette smoking, with 25% of current users and 65% of ever users [4]. Waterpipe smoking has also been associated with male sex, public schools, and secondary education. Another study for school adolescents aged 13-15 in the Gulf Cooperation Council (GCC) countries reported a frequency ranging from 9% in Oman to 16% in Kuwait [4]. Another study in the US showed that waterpipe use was common among youth and young adults, with 7.8% of high school students and 12.3% of young adults using it in the last year. Sociodemographic variance within the United States was also noticed, with Hispanic high school pupils being more likely to smoke than white students; however, no sex variation was observed in these studies [5, 10]. According to another survey in the US, more than three-quarters (79.6%) of current waterpipe users ages 12-17 socialize while using this product [11]. Waterpipe bars and cafés are becoming increasingly popular among youth and young adults, promoting these settings as sociable, enjoyable, and relaxing. Furthermore, the exemption of these establishments from smoke-free law fosters their spread.

The Middle East has a high prevalence of current waterpipe smoking among university students, with a range of 6% in the GCC countries to 15% and 28% in Syria and Lebanon, respectively [6]. Waterpipes in groups are a widespread practice in Lebanon and Egypt [6]. The prevalence of “ever used”

waterpipe was examined among university students in the United States, the United Kingdom, Pakistan, and Iran, with 41%, 38%, 54%, and 24% prevalence, respectively [12]. According to one poll of 152 universities in the US, the prevalence of current waterpipe smoking is 8.9%, second only to cigarette smoking [4].

Adult prevalence varies among nations as well. According to a study conducted in 2011, current adult users are more prevalent in Middle Eastern nations: 15% in Lebanon, 9-12% in Syria, and 4-12% in Arab Gulf countries [5, 10]. Compared to young individuals, older adults are less likely to smoke waterpipes. In one multinational study in the Middle Eastern region, adults aged 40 and older had a lower prevalence of waterpipe smoking than young adults. The age of initiation is unclear and varies widely depending on the population studied. However, studies show that the age of initiation tends to be early in societies where waterpipe smoking is a well-established culture. According to one survey of US adults, 41.5% of current waterpipe smokers intended to quit, compared to 56.8% of current cigarette smokers [4]. Waterpipe users tend to smoke intermittently compared to cigarette smokers [4]. Another recent systematic review study in 2023 showed an escalating prevalence of waterpipe smoking among adults in the Eastern Mediterranean countries, Figure 2, [6]. The overall prevalence of cigarette smoking and waterpipe smoking was 17.4% and 6.9%, respectively. Specifically, waterpipe smoking prevalence ranged from 1.1% to 8.6% in the GCC countries, to 20.9% in Palestine [6]. Despite the decrease in cigarette smoking by 7.2% in the past decade, waterpipe smoking has increased by 7.8%. The study also highlights that WPS is associated with significant risk factors for several diseases; the highest risk was found for esophageal, lung, and gastric cancers.



**Figure 2.** Prevalence of current smoking (cigarette smoking and waterpipe smoking) in some of the Middle Eastern Countries [6].

### 1.3. Knowledge and Attitudes Toward Waterpipe Smoking

People's perceptions and attitudes regarding waterpipes are significantly impacted by the tobacco industry's deceptive information, particularly in the absence of credible, unequivocal health warnings. According to studies on waterpipe smoking associations, there is a dearth of fundamental awareness about waterpipe smoking and its adverse health effects [5, 10, 13]. Studies on college students show that current waterpipe users believed that using waterpipes was more socially acceptable and healthy than smoking cigarettes [14]. The study, on the other hand, found favorable associations with waterpipe smoking such as social appeal, peer pressure, physical attractiveness, pleasurable smoke, in comparison to cigarette smoking [5, 10]. When compared to smoking cigarettes, waterpipe smokers have a lower intention to quit.

## 2. Health Impact of Waterpipe Smoking

Waterpipe smoking, like cigarette smoking, is harmful to health due to the presence of 82 hazardous compounds and carcinogens [1, 5]. The negative health impact is due to the triple synergistic effect of tobacco smoke, inhaling charcoal smoke, and vulnerability to infectious diseases. Short-term effects include increased heart rate and blood pressure, while long-term health outcomes include mouth, esophageal, and lung cancers, cardiovascular diseases, respiratory illnesses, infectious diseases, antenatal adverse effects, and nicotine dependence. Both traditional waterpipe smoke and cigarette smoke produce toxic compounds like nitrosamine, polycyclic aromatic hydrocarbons (PAH), and volatile organic and inorganic compounds [14]. However, the amount of these chemicals may differ due to variations in heating processes

and charcoal combustion. A study found comparable cardiovascular risk between conventional cigarettes and waterpipe smoke [3].

There is a scarcity of information on the risk of second-hand exposure to waterpipe smoking [15]. Studies showed that second-hand exposure to waterpipe smoking increases the risk of respiratory diseases [1, 3]. One study in Iran examined the prevalence of second-hand exposure to waterpipe smoking in various places, and results showed that exposure was highest at homes (93.4%), coffee shops (17.1%), and restaurants (11.5%). There is little data on the composition of waterpipe smoke, with several studies testing the air quality in waterpipe clubs. When compared to one cigarette, side stream smoke analysis revealed that a single session of waterpipe related to four times as many carcinogenic PAH, four times as much volatile aldehydes, and thirty times as much Carbon monoxide (CO) [15]. Additional environmental measures for carcinogens and chemicals are required in locations where waterpipes are provided.

## 3. Challenges in Capturing the Waterpipe Smoking Data

The most difficult aspect of collecting waterpipe smoking data is capturing the related sociodemographic and behavioral risk factors that lead to the rise in waterpipe prevalence. Furthermore, despite efforts made by Global tobacco Surveillance System, primarily through Global Adult Tobacco Survey (GATS) and Global Youth Tobacco Survey (GYTS), to standardize tobacco monitoring globally, most of the monitoring efforts are focused on cigarette smoking. The definition and pattern (daily, ever, former) of the waterpipe use were not studied thoroughly in national and international surveys as they are in cigarette smoking, particularly in surveys where tobacco questions are integrated into the country-specific national survey. The poll also does not record the length of a

waterpipe smoking session as this also contributes to the adverse health outcomes. Some waterpipe users do not consider themselves as smokers; thus, while investigating the smoking status, the definition should be carefully specified [4].

An effective waterpipe-specific surveillance system should be established and updated to include emerging non-compostable products. Applying the same pattern used as cigarettes (daily, ever, occasionally) is helpful yet not enough as the puffing habits for waterpipe users differ from one person to another and from one place to another. For example, the number of puffs, the duration of session, interval between puffs, and dual exposure need to be captured. Additionally, surveillance needs to explore the underlying sociodemographic and behavioral factors associated with waterpipe use [3].

#### 4. Economic Aspect of Waterpipe Smoking

Several factors have led to the current global proliferation of waterpipe smoking. First, the introduction of flavored waterpipe tobacco products, such as Massiel, fruit flavors, and sweet flavors, plays a significant role as a motivator for waterpipe use [1]. According to US studies conducted at eight colleges in North Carolina, 90% of all waterpipe smokers consumed flavored tobacco [15]. Fruit flavors were the most popular waterpipe tobacco consumed, with no significant sex variation [3].

Second, there is an overlap between the social nature of waterpipe smoking and café culture, which is an important social gathering place, particularly in Middle Eastern nations. This practice has extended to Western countries. In the United Kingdom, for example, there are approximately 400 waterpipe cafés in London alone. Additionally, waterpipe products come in different flavors; and this makes it more appealing to

the young generation [16].

Third, the increased access to the internet, mainstream media, and social media can be blamed for the rising popularity of waterpipe smoking among teenagers and young people. The waterpipe industry recognized the significance of these venues in marketing its lethal products. Since 2004, there has been a rise in online searches for waterpipe smoking and electronic nicotine-delivering systems (ENDS) worldwide. In certain countries, the trend for waterpipe smoking search is more common than for ENDS [15]. This was impacted by the internet's lax regulations, which allowed advertisers to bypass much of the restrictions and reach their intended audience. In one study, only 4.0% of the 144 websites studied waterpipe smoking venues in the US included tobacco-related health warnings [15].

Even though most public health successes have been directed at cigarette smoking, waterpipe smoking regulations are inadequate. Waterpipe firms and producers are free from tobacco control legislations, particularly in developing countries. In contrast to cigarette smoking, nicotine and flavoring standards are also lax. Furthermore, due to the lack of standardization, the size, form, and style of waterpipe smoking vary greatly.

#### 5. Regulatory and Policy Measures to Combat Waterpipe Smoking

Waterpipe smoking prevalence is growing globally; however, many regions of the world still lack a solid foundation for the supply and demand reduction measures to combat it. The WHO Framework Convention on Tobacco Control [17] advocates an end to tobacco epidemics of all kinds. It is worth considering the WHO MPOWER measures as an essential demand reduction strategy for reducing the impact of emerging waterpipe use Table 1.

**Table 1.** The WHO MPOWER Demand-reduction measures in addressing waterpipe smoking. (WPS).

Article 21: Monitoring waterpipe use	<ol style="list-style-type: none"> <li>1. Ensure effective surveillance system in place for assessing WPS</li> <li>2. Ensure effective surveillance system for monitoring and evaluating outlet distribution, use, and health impacts of WPS</li> </ol>
Article 8: Protecting people from second-hand smoke	<ol style="list-style-type: none"> <li>1. Waterpipe cafés and lounges must adhere to 100 % smoke-free indoor air laws</li> <li>2. Prohibit indoor WPS from enclosed public areas like malls</li> </ol>
Article 14: Offer tobacco cessation service	<ol style="list-style-type: none"> <li>1. Ensure tobacco cessation services are available at primary healthcare settings</li> <li>2. Offer brief advice to tobacco users at each clinical encounter</li> <li>3. Establish a toll-free Quitline to assist smokers in their quit journey</li> </ol>
Article 11, 12: Warn about the danger of tobacco use.	<ol style="list-style-type: none"> <li>1. Prohibits manufacturers and third parties from making health claims for WPS (e.g., "tobacco free", "contains 0% tar or 0.05% nicotine") and its accessories, including charcoal claims ( e.g. "odorless", "free of chemicals", "100% natural")</li> <li>2. Health warnings on tobacco packaging and labelling should be extended to WPS products and their accessories</li> </ol>

	<ol style="list-style-type: none"> <li>3. Health warnings on WPS products should be rotated, clear, and cover at least 30% of the display area</li> <li>4. Address the health impact and fallacy of WPS at all levels .</li> </ol>
Article 13: Enforcing ban on advertisement, promotion, and sponsorship (APS)	<ol style="list-style-type: none"> <li>1. Ensure that WPS products ban on APS is covered by regulations</li> <li>2. Ensure online banning of APS is also covered by regulation</li> </ol>
Article 6: Raising tobacco tax	<ol style="list-style-type: none"> <li>1. Ensure that effective tax measures cover WPS products and their accessories</li> <li>2. Consider taxing WPS products per individual serving or at higher bulk prices</li> <li>3. Avoid selling WPS products and their accessories in duty-free areas</li> </ol>

Source: [1]

The complex context of waterpipe smoking, which includes the location, the tobacco products, the equipment/accessories, and charcoal, should be addressed by regulators whenever addressing waterpipe smoking control. Several aspects can be addressed about waterpipe smoking. First, flavored waterpipe smoking is the primary motivator for the younger generation to start and continue smoking. Regulations that consider banning flavored waterpipe items could prevent the alarming rise in waterpipe usage. Second, smoking waterpipe exposes one to several toxins at a similar amount as smoking a cigarette. However, the substances used in waterpipe products are unregulated, and thus more control measures are required to control waterpipe's chemical composition. Third, the heating source for waterpipe tobacco products, including charcoal and electrical heating, should be regulated. Electrical heating may significantly decrease carbon monoxide (CO) production, but higher levels of aldehydes are produced, which are associated with adverse health effects. From a regulatory perspective, no 'safe' heating source for waterpipe smoking can be advised [18]. Fourth, almost all waterpipe products and their accessories do not comply with the regulations on health warning labelling practices as stipulated under Article 11 of the WHO FCTC. Changing the packaging itself, by making it more generic and less attractive, and adding a health warning, is an option for policy makers to discourage waterpipe use [18]. It is advised that waterpipe smoking in lounges be accompanied with a warning on the waterpipe device and/or the menu, or on the lounge entry. Smoking regulations should also cover smoking in public spaces like restaurants and bars. Fifth, raising tobacco prices is the most effective strategy for reducing teenage smoking. Equalizing tax rates on waterpipe tobacco products and cigarette tobacco products would make them less affordable to vulnerable populations. This would likely reduce youth waterpipe smoking. Studies showed that for every 10% increase in the real price of cigarettes, the number of youths who smoke drops by 6% to 7% [19]. This can be applied to waterpipe smoking; the higher the tax in WPS and its accessories, the more reduction in initiation among vulnerable groups. Sixth, smoke-free laws without exceptions for waterpipe lounges can protect more workers from second-hand smoke and limit misperceptions perpetuated on waterpipe lounge websites [20]. Seventh, there are

several online retailers offering delivery of waterpipe tobacco. In the US, major credit card companies agreed to cease processing payments for cigarettes made online, but they still accept payments for waterpipe tobacco products. Additionally, the US forbids the Postal Service from sending cigarettes, smokeless tobacco, and roll-your-own tobacco products; however, it does not forbid sending waterpipes or other pipe tobacco products. Extending the act to limit card processing for online sales and on shipping all tobacco items including waterpipes is required. Table 1 summarizes the MPOWER demand-reduction measure that can be implemented to strengthen the regulation of WPS and thus reverse the trend of waterpipe smoking.

## 6. Conclusion

Waterpipe smoking prevalence is a global public health concern. While the international efforts in combating tobacco use showed a reduction in overall tobacco use, the prevalence of waterpipe smoking has increased over time, especially in the Eastern Mediterranean regions. Many factors contributed to the global spread of waterpipe including, the introduction of flavored tobacco products, the thriving café culture, the impact of the internet and social media, the introduction of electronic waterpipes, and the lack of waterpipe specific regulations. Current evidence showed that waterpipe smoking tends to be in young age groups, individuals with higher educational attainment, and those who smoke cigarettes. Development of waterpipe specific surveillance and regulations can aid to limit its spread. The development of waterpipe-specific surveillance system and regulations can aid in limiting its spread. More research is required to further understand the sociodemographic and health-related factors related to waterpipe smoking.

## Abbreviations

WPS	Waterpipe Smoking
FCTC	Framework Convention on Tobacco Control
GCC	Gulf Cooperation Council Countries
GATS	Global Adult Tobacco Survey

GYTS Global Youth Tobacco Survey  
PAH Polycyclic Aromatic Hydrocarbons

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## Conflicts of Interest

No financial or non-financial competing interest exists for this review.

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