Review on the Implementation of the Islamic Republic of Iran about Tobacco Control, Based on MPOWER, in the Framework Convention on Tobacco Control by the World Health Organization

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Review Article

Abstract

Background: Smoking is the largest preventable cause of death in the world, killing nearly 6 million people annually. This article is an investigation of measures implemented laws in the Iran to study the proposed strategy of control and reduce tobacco use based on the monitor, protect, offer, warn, enforce and raise (MPOWER) policy.

Methods: All laws approved by the Parliament along with the instructions on tobacco control prepared by the Ministry of Health and Medical Education, Ministry of Industry, Mine and Trade were collected and studied. Moreover, practical steps of Ministry of Health and other organizations were examined in this regard.

Findings: Iranian Parliament after the adoption of the Framework Convention on Tobacco Control (FCTC) acts to create a comprehensive and systematic program for tobacco control legislation as a first step towards comprehensive national tobacco control and combat. In this law and its implementing guidelines and based on the strategy of MPOWER, specific implement is done to monitor tobacco use and prevention policies, protect people from tobacco smoke, offer help to quit tobacco use, warn about the dangers of tobacco, enforce bans on tobacco advertising, promotion and sponsorship and raise taxes on tobacco. However, the full objectives of the legislation have not achieved yet.

Conclusion: According to Iran's membership in the FCTC and executive producer of tobacco control laws and regulations, necessary infrastructure is ready for a serious fight with tobacco use. In Iran, in comparison with developed countries, there is a huge gap between ratified laws and performing of laws.

Keywords: Laws; Tobacco; Control; Iran

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Introduction

Smoking is known as the largest preventable cause of death in the world and kills about 6 million people in the world annually, among which 5 million of them are the direct consumers of tobacco products and the rest are only exposed to the secondhand and the third category smoke.1 More than 80% of the population of a one billion tobacco users in the world live in low-income and middle-income countries.2 Almost 37% of over 10-year men in the world use tobacco products, especially cigarette. Surveys of tobacco use in developing countries showed the rising trend of smoking among men and women.3 Smokers enter smoke into their bodies and those around them. This smoke composes of a large number of toxins such as nicotine, toxic gases like formaldehyde and carbon monoxide, heavy metals like cadmium and other toxic substances. These substances have carcinogenic, mutagenic and teratogenic effects. In general, smoking and water pipe tobacco contains over 4000 chemicals and majority of them have been proven to be carcinogenic.⁴⁸ In smokers, the risk of lung cancer is 25 times increased and the risk of heart attacks and strokes are 2-4 times greater than non-smokers.8

According to statistics from the Ministry of Health of Iran, more than 50 billion cigarettes are consumed annually in this country. Water pipe tobacco causes the death of more than 50 thousand people each year. Moreover, calculating the burden of disease and treatment have shown dramatic cost in the country.9,10 Unfortunately, in addition to cigarette smoking, water pipe tobacco use is considered as a major health problem due to cultural conditions in Iran. Generally, a water pipe tobacco smoker takes a puff of smoke into his lungs 200 times, with the capacity of 90000 ml of smoke, in one hour. In comparison, it is calculated 20 times with 500 to 600 ml capacity for a cigarette.11-14 Accordingly, the absence of systematic control on tobacco use by governments will be very painful on the path to global health. Fortunately, World Health Organization (WHO), as a trustee monitoring and health promotion in the world, has taken certain actions to establish a common approach to this problem. This article is an investigation of measures implemented in Iran to study the proposed strategy of control and reduce tobacco use based on MPOWER.

Methods

All legislated laws in Parliament along with the instructions on tobacco control prepared by the Ministry of Health and Medical Education, and the Ministry of Industry, Mine and Trade were collected and studied. Moreover, practical steps of Ministry of Health and other organizations were examined in this regard. All legislated laws and administrative regulations prepared by the related organizations were classified based on the subject and each of them was discussed using MPOWER strategy separately.

Results

After setting up and verifying the WHO Framework Convention on Tobacco Control (FCTC) on May 21, 2003, Islamic Republic of Iran have legislated the text of global tobacco control convention on October 6, 2005. As the first action, the cabinet of Ministers approved the comprehensive and national control acts on tobacco to implement the aforementioned law.15-¹⁷ In order to the implementation of article 5 of the convention, the Ministry of Health and Medical Education is responsible for preparation of national comprehensive strategies for tobacco control and its follow-up. This article is about examining the measures related to the proposed strategies in order to control and reduce tobacco use in Iran, based on MPOWER policy. Following the approval of FCTC, to create a comprehensive and systematic program for tobacco control, as the first step, the Parliament tried to be taken comprehensive national tobacco control legislation. According to article 1 of the law, in order to plan for combating tobacco consumption and protecting public health, the country committee of control and combating tobacco, headed by the Ministry of Health, was established.^{15,18} The committee tasks include codification executive orders related definitions and advertising features, drafting adoption of training programs and researches in collaboration with related organizations, and editing of messages, warnings, images, and designs associated with the social, economic and health adverse effects of tobacco and their time bounding. The decisions of the committee are applicable after the President's approval. 19

Table 1. Tobacco use data from the latest survey results as at 31 December 2014

Smoking prevalence (%)	Youth tobacco use	Adult tob	Adult tobacco use	
	Current tobacco smoking*	Current	Daily	
Man	7.5	20.8	19.2	
Woman	4.2	0.9	0.6	
Both sexes	5.9	10.9	9.9	

Youth: CASPIAN study, 2011-12; National, ages 6-18; Adult: Sixth national survey of NCD Risk Factors Surveillance, 2011; National, ages 15-64. ²⁰

Discussion

MPOWER policy package, proposed by WHO, aims to contribute to adoption implementation of the basic strategies for reducing tobacco consumption. This policy includes the following parts: Monitor tobacco use and prevention policies, protect people from tobacco smoke, offer help to quit tobacco use, warn about the dangers of tobacco, enforcing bans advertising, tobacco promotion sponsorship, and raise taxes on tobacco. All actions of Iran in order to tobacco control based on MPOWER are listed as below.

For monitoring of tobacco, after accepting FCTC in Iran in cooperation with WHO, several national monitoring programs of smoking prevalence was conducted among Iranians. Based on the results of Iran latest evidence, which has been reported to WHO, the prevalence of smoking is listed in tables 1 and 2.²⁰

Although these figures have been extracted from standard monitoring results, the actual prevalence of tobacco use in Iran may not be reported because of the cross-sectional nature and investigating certain groups of society. Therefore, different measures have resulted in increased awareness and smoking stop, including implementation of the rural family medicine program in Iran, the annual census, preparing the list of smokers, and educating the smokers and their family members. If the similar program in

different cities of Iran is implemented it can help to achieve the goal of reducing tobacco use. The implementation of this program in the urban population can be also successful.

The best practices in order to protect the people from secondhand tobacco smoke are creating tobacco-free places and banning smoking in these places. Hereof, according to article 13 of the comprehensive national struggle-smoking, smoking in offices and government agencies are forbidden and offending is pursued by the laws of administrative offenses. 10,21 The most important laws and policies on tobacco control that have protect people approved to secondhand smoke and third-party smoke are tobacco control laws in public places, food production and distribution sites, parks and tourist sites. In accordance with note 1 of article 13 of the comprehensive control and counterfeit comprehensive law and paragraph 8 of article 1 of executive regulations of the act in order to protect the health of people against exposure to smoke and water-pipe smoking, the use of any tobacco products is prohibited in parks and public spaces.^{22,23} Furthermore, based on article 7 of the executive regulations of comprehensive national struggle-smoking law, smoking in all public places and public transport is prohibited. In this regard, according to the latest Council of Minister's approval letter, offenders are liable to a fine of 22 to 43 thousand Tomans.

Table 2. World Health Organization (WHO) age-standardized estimated prevalence of smoking among those aged 15 years or more: Year 2013

Adult prevalence, smoking (%)	Any smoked tobacco		Cigarettes	
	Current	Daily	Current	Daily
Man	22.4	20.0	15.0	10.8
Woman	1.0	0.8	0.6	0.4
Both sexes	11.7	10.4	7.8	5.6

^{*}Definition is ever smoking, not current smoking

In order to program execution of helping smokers quit smoking, and based on article 9 of comprehensive national tobacco control and struggle law, by 2016, in all health centers across the country at least one smoking cessation counseling center has been held freely to provide services to applicants to quit. But with the integration of tobacco control programs in health system from 2017, all health centers covered by the Ministry of Health also will be working as a free quit-smoking counseling center. At these centers, physicians, health professionals, and trained mental health professionals provide education and health services needed to applicants. Moreover, non-governmental smoking cessation counseling centers are supported by the Ministry of Health.

Warning about the dangers of tobacco known as an important factor in smoking prevention. In this regard, based on articles 6 and 16 of comprehensive national struggle-smoking law, distribution of tobacco by no health warning labels considered infringement, and offenders are sentenced to pay a fine. The use of misleading terms such as light and low-coal tar on the packaging is prohibited. Every year and during the national anti-smoking week, 3rd to 10th of June, public campaigns and training sessions are held to inform the public about the effects of smoking, and also to inform a greater number of people about the control and antismoking programs. 10,24,25 Under the agreement between the Ministry of Health and the Ministry of Education of Iran, it is pledged to pay more attention to students, as a most educable population of the community, to create the necessary cooperation about awareness of programs on tobacco control. In all health centers and health houses, training sessions are held regularly for all people and particularly target groups of tobacco control program including students, youth, wife of smokers and smokers themselves.

One of the cases that tobacco industry has used to expand smoking was the use of television advertising and famous actors as a model for smoking. Therefore, combating tobacco television advertising on supply and demand, due to the increasing development of digital products, would have a direct impact on reduction of smoking. ²⁶⁻²⁹ In order to the prohibit the advertising, promotion, and sponsorship of

tobacco industry, articles 3, 10 and 15 of the comprehensive national tobacco control have been approved. According to these articles and also articles 2 to 6 of comprehensive law enforcement and combating tobacco control regulations, any advertising and encouraging of tobacco products is prohibited and punished.

According to various studies, the impact of increased tax of tobacco products on reduction of its consumption has been proven.30-33 In Iran, raising taxes on tobacco was the main challenge of FCTC implementation and still is controversial between Ministry of Health and Parliament. Wide boundaries and the tobacco products trafficking with low price were the main reasons to avoid tax increases by Iranian Tobacco Company and Parliament. Article 8 of comprehensive national tobacco control and struggle law explicitly states 10% tax increase on tobacco products which unfortunately has not been done yet.¹⁰ The results of the review of existing laws and guidelines indicate that the policy and approval of national control laws on tobacco in Iran are close to international and developed countries laws. According to a study by banks and associates in the Eastern Mediterranean region, Iran has ranked first in terms of policy, legislation, and implementation, which introduces Iran as a model for other countries in the region. In Iran, the implementation of tobacco control laws is significantly lower in comparison with developed countries, especially in the Scandinavian countries, due to tobacco industry lobbying, noncompliance in law enforcement, the expansion of the use of water-pipe smoking and the lack of sufficient funds to enforce the law.34

Conclusion

According to Iran membership in FCTC and the preparation of regulations and executive instructions of tobacco control, the necessary infrastructure for a serious struggle by the ominous phenomenon of smoking are ready. Implementation of all existing laws and trying to grow and improve the training and knowledge of the people about the effects of smoking and benefits of quitting it would control and reduce the prevalence of smoking among Iranians in the near future. Since smoking is one of the major pathways of drug addiction, reducing smoking would directly

diminish narcotics consumption. We hope that Iran can be a good model for other countries in the Middle-East on tobacco control.

Conflict of Interests

The Authors have no conflict of interest.

References

- 1. World Health Organization. Tobacco [Online]. [cited 2017]; Available from: URL: http://www.who.int/mediacentre/factsheets/fs339/en
- 2. World Health Organization. WHO report on the global tobacco epidemic, 2017: Iran (Islamic Republic of) [Online]. [cited 2017]; Available from: URL: www.who.int/tobacco/surveillance/policy/country p rofile/irn.pdf
- 3. World Health Organization. Prevalence of tobacco smoking [Online]. [cited 2015]; Available from: URL: http://www.who.int/gho/tobacco/use/en
- 4. Zenzes MT. Smoking and reproduction: Gene damage to human gametes and embryos. Hum Reprod Update 2000; 6(2): 122-31.
- 5. Sharma R, Biedenharn KR, Fedor JM, Agarwal A. Lifestyle factors and reproductive health: Taking control of your fertility. Reprod Biol Endocrinol 2013; 11: 66.
- 6. Calogero A, Polosa R, Perdichizzi A, Guarino F, La Vignera S, Scarfia A, et al. Cigarette smoke extract immobilizes human spermatozoa and induces sperm apoptosis. Reprod Biomed Online 2009; 19(4): 564-71.
- 7. Kunzle R, Mueller MD, Hanggi W, Birkhauser MH, Drescher H, Bersinger NA. Semen quality of male smokers and nonsmokers in infertile couples. Fertil Steril 2003; 79(2): 287-91.
- 8. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. The health consequences of smoking-50 years of progress: A report of the surgeon general. Atlanta, GA: Centers for Disease Control and Prevention; 2014.
- 9. Maziak W, Nakkash R, Bahelah R, Husseini A, Fanous N, Eissenberg T. Tobacco in the Arab world: Old and new epidemics amidst policy paralysis. Health Policy Plan 2014; 29(6): 784-94.
- 10. Ministry of Health and Medical Education, Health Department. Control and reduce tobacco use in youth and teens [Online]. [cited 2014]; Available http://mboh.umsha.ac.ir/uploads/14 141 dokhaniya t.pdf
- 11. Momenabadi V, Iranpour A, Khanjani N, Mohseni M. Effect of educational intervention on water pipe behaviour of students in dormitories of Kerman

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- Medical University: BASNEF Model. J Health Promot Manag 2015; 4(3): 12-22.
- 12. Momenabadi V, Hossein K, Hashemi SY, Borhaninejad VR. Factors affecting hookah smoking trend in the society: A review article. Addict Health 2016; 8(2): 123-35.
- 13. Akl EA, Gaddam S, Gunukula SK, Honeine R, Jaoude PA, Irani J. The effects of waterpipe tobacco smoking on health outcomes: A systematic review. Int J Epidemiol 2010; 39(3): 834-57.
- 14. El-Zaatari ZM, Chami HA, Zaatari GS. Health effects associated with waterpipe smoking. Tob Control 2015; 24(Suppl 1): i31-i43.
- 15. Islamic Parliament Research Center of the Islamic Republic of Iran. The accession of the Islamic Republic of Iran to the World Health Organization framework convention on tobacco control [Online]. [cited 2005]; Available from: URL: http://rc.majlis.ir/fa/law/print version/97946 [In Persian].
- 16. Islamic Parliament Research Center of the Islamic Republic of Iran. The comprehensive control and control of national tobacco control act [Online]. [cited 2007]; Available from: URL:
 - http://rc.majlis.ir/fa/law/show/97817 [In Persian].
- 17. Ministry of Health Medical Education. Executive regulations of the comprehensive control and control national tobacco control act [Online]. [cited 2007]; Available from: URL: http://www.behdasht.gov.ir/includes/newsprint.jsp?i d=5590&sid=1&pid=13399 [In Persian].
- 18. von Goethe JW. MPOWER: Six policies to reverse the tobacco epidemic. Geneva, Switzerland: WHO Report on the Global Tobacco Epidemic; 2008.
- 19. Ministry of Health Medical Education. National Action Plan for Prevention and Control of Communicable-Non Diseases and the Related Risk factors in the Islamic Republic of Iran [Online]. 2015]; Available from: www.sbmu.ac.ir/uploads/dasgh15.pdf [In Persian].
- 20. World Health Organization. Framework convention on tobacco control (FCTC) [Online]. [cited 2014]; Available from: URL: http://www.who.int/fctc/en
- **21.** Public Places Law [Online]. [cited 1992]; http://rc.majlis.ir/fa/law/print_version/108077 [In Persian].

- 22. Tobacco Control Headquarters. Guidelines for determining of distributer and sealer of tobacco products [Online]. [cited 2008]; Available from:

 URL: https://portal.arakmu.ac.ir/Portal/File/ShowFile.aspx?ID=4c374eb1-2f27-4890-8783-25f821262c22?
 [In Persian].
- **23.** Instructions for dealing with the use of water-pipe smoking and tobacco products in the parks and public spaces [Online]. [cited 2016]; Available from: URL:
 - www.mums.ac.ir/shares/behdasht3/eatedalie1/mohit/ghelian.doc [In Persian].
- **24.** Saffer H, Chaloupka FJ. Tobacco advertising: Economic theory and international evidence. Cambridge, MA: National Bureau of Economic Research; 1999.
- **25.** Lewit EM. U.S. tobacco taxes: Behavioural effects and policy implications. Br J Addict 1989; 84(10): 1217-34.
- **26.** Thomson CC, Fisher LB, Winickoff JP, Colditz GA, Camargo CA Jr, King C 3rd, et al. State tobacco excise taxes and adolescent smoking behaviors in the United States. J Public Health Manag Pract 2004; 10(6): 490-6.
- **27.** Tauras JA. Public policy and smoking cessation among young adults in the United States. Health Policy 2004; 68(3): 321-32.
- **28.** Mousavi SG. The relationship between smoking and drug use. Pajouhesh Dar Pezeshki2003; 8(3): 57-9.

- [In Persian].
- **29.** World Health Organization. Tobacco free initiative (TFI) [Online]. [cited 2013]; Available from: URL: http://www.who.int/tobacco/mpower/en
- **30.** Spires M, Rutkow L, Feldhaus I, Cohen JE. The World Health Organization's MPOWER framework and international human rights treaties: An opportunity to promote global tobacco control. Public Health 2014; 128(7): 665-7.
- **31.** Castillo-Fernandez OO, Lim M, Montano L, Bellido D, Lopez R. P1.07: University students' perceptions about effectiveness of MPOWER policies on tobacco control: Track: Prevention, early detection, epidemiology and tobacco control. J Thorac Oncol 2016; 11(10S): S184.
- **32.** Hassanvand MS, Naddafi K, Faridi S, Arhami M, Nabizadeh R, Sowlat MH, et al. Indoor/outdoor relationships of PM10, PM2.5, and PM1 mass concentrations and their water-soluble ions in a retirement home and a school dormitory. Atmos Environ 2014; 82(Supplement C): 375-82.
- **33.** Faridi S, Hassanvand MS, Naddafi K, Yunesian M, Nabizadeh R, Sowlat MH, et al. Indoor/outdoor relationships of bioaerosol concentrations in a retirement home and a school dormitory. Environ Sci Pollut Res Int 2015; 22(11): 8190-200.
- **34.** Banks C, Rawaf S, Hassounah S. Factors influencing the tobacco control policy process in Egypt and Iran: A scoping review. Glob Health Res Policy 2017; 2: 19.

مروری بر اقدامات جمهوری اسلامی ایران در خصوص کنترل دخانیات بر اساس MPOWER در راستای اجرای کنوانسیون چارچوب سازمان جهانی بهداشت در مورد کنترل دخانیات (WHO FCTC)

دکتر محمود علیمحمدی ٔ، حسین جعفری منصوریان ٔ ، سید یاسر هاشمی ٔ ، ویکتوریا مؤمن آبادی ٔ ، سید مهدی قاسمی ^۵، کمالالدین کریمیان ٔ

مقاله مروري

چکیده

مقدمه: استعمال دخانیات، بزرگترین عامل مرگ قابل پیشگیری در جهان شناخته می شود و سالیانه حدود ۶ میلیون نفر را در جهان به کام مرگ می کشد. هدف از انجام مطالعه حاضر، بررسی راهبرد پیشنهاد شده کنترل و کاهش مصرف دخانیات Monitor, Protect, Offer, Warn, Enforce and Raise هدف از انجام مطالعه حاضر، بررسی راهبرد پیشنهاد شده کنترل و کاهش مصرف دخانیات (MPOWER) و مجموعه اقدامات اجرا شده در کشور ایران بود.

روشها: کلیه قوانین مصوب مجلس شورای اسلامی و دستورالعملهای مربوط به کنترل دخانیات که توسط وزارت بهداشت، درمان و آموزش پزشکی و وزارت صنعت، معدن و تجارت تهیه شده و در دسترس بود، جمعآوری گردید و مورد مطالعه قرار گرفت و اقدامات عملی وزارت بهداشت و سایر ارگانهای ذیربط در این زمینه بررسی شد.

یافته ها: مجلس شورای اسلامی ایران پس از تصویب Framework Convention on Tobacco Control)، در قدم اول به ایجاد برنامه مدون و سیستماتیکی جهت کنترل دخانیات و تهیه قانون جامع کنترل و مبارزه ملی با دخانیات اقدام نمود. در این قانون و سایر دستورالعملهای اجرایی آن بر اساس راهبردهای شش گانه MPOWER، اقدامات خاصی در راستای اجرای پایش مصرف دخانیات در کشور، حفاظت از مردم در برابر دود، کمک به ترک استعمال دخانیات، هشدار در مورد مضرات دخانیات، ممنوعیت تبلیغ، ترویج و حمایت مالی صنایع دخانی و افزایش مالیات بر محصولات دخانی صورت گرفت؛ اگرچه هنوز اهداف قوانین به طور کامل ارایه نیامده است.

نتیجه گیری: با توجه به عضویت ایران در FCTC و تهیه قوانین و مقررات و دستورالعملهای اجرایی کنترل دخانیات، زیرساختهای لازم برای مبارزه جدی با پدیده شوم مصرف دخانیات آماده است. در ایران در مقایسه با کشورهای توسعه یافته، شکاف بین قوانین وضع شده و اجرای قوانین زیاد میباشد.

واژگان کلیدی: قوانین، دخانیات، کنترل، ایران

ارجاع: على محمدى محمود، جعفرى منصوريان حسين، هاشمى سيد ياسر، مؤمن آبادى ويكتوريا، قاسمى سيد مهدى، كريميان كمال الدين. مرورى بر اقدامات جمهورى اسلامى ايران در خصوص كنترل دخانيات بر اساس MPOWER در راستاى اجراى كنوانسيون چارچوب سازمان جهانى بهداشت در مورد كنترل دخانيات (WHO FCTC). مجله اعتياد و سلامت ۱۸۹۶-۱۸۳.

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