Worldwide Experienced Policy and Management Interventions in Preventing and Controlling Water Pipe Smoking

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Abstract

Background: A review is carried out to identify management and policy interventions affecting preventing and controlling Water Pipe Smoking (WPS) worldwide.

Methods: PubMed, ISI Web of Science, Embase, Scopus, Science Direct, and Ovid from 1990 to August 2018 were reviewed through a literature review process. Primary studies reported at least one intervention in preventing and controlling WPS. The surveyed studies were independently checked by two investigators and quality appraised, and relevant data were extracted.

Results: Out of 4343 retrieved records from the databases, 2228 records were screened, and 38 studies were selected as the main corpus of the study. The interventions identified from the content analysis process were placed in two main categories, namely management and policy interventions. The category of management interventions was related to the prevention and control measures of WPS. The category of policy interventions focused on the enactment and implementation of legislatives and policies to control WPS in national and international levels. Most interventions focused on school-based education and lack of proper interventions in WP industry.

Conclusion: Our findings indicate that governments are ignorant of this important social and health crisis, and very few measures have been taken to control WPS. Informed interventions, especially among school-based and adolescents can lead to promising results in preventing and controlling WPS. There is a need to develop and design WP-specific evidence-based interventions.

Background

Tobacco smoking is one of the main preventable causes of diseases and deaths claiming the lives of 7.2 million annually [1, 2]. Water Pipe Smoking (WPS) is a culture-based method of tobacco use [3] whose history goes back to 500 years ago; however, it has experienced a worldwide re-emergence since 1990 [4], and is regaining popularity among various populations, especially school and university students. In European countries such as Latvia and Berlin, 23 and 32.2% of school students respectively smoke it. In the eastern Mediterranean Region, the prevalence of WPS is high as well where 39.0% and 31.0% of boys and girls respectively smoke WP, and Lebanon has the highest rate (37%) [5–6]. In the United States, more than 30% of university students of both genders experience
WPS, and nearly 23% of high school students smoke WP [7-9]. Similarly, WPS is increasing among highly educated groups. Nearly 20% of health professionals in Jordan and 52% of medical students in London smoke WP [10-11]. In Pakistan, 29.5% of physicians experience WPS [12].

WPS is turning to a public health crisis. Its smoking rate compared to that of cigarette is more addictive, contains more toxic and carcinogenic substances [13-15] and causes a variety of diseases including cancers, syndromes, and various unfavorable health effects [16]. It has a negative impact on health costs and Gross Domestic Product (GDP) of the countries. For example, in the United States, direct and indirect cost of smoking-related diseases is up to $300 billion annually [17-19].

The WP business is rapidly growing and gaining popularity worldwide. There are multiple stakeholders that support its expansion [20]. In recent years, the number of WP cafes has increased worldwide. For example, in the United Kingdom, there are nearly 400 WP cafes only in London [21].

There are many reasons for the in cafes to be interested in WPS and include deceptive advertising and diversified incentive services in addition to water pipe. The main reasons include a variety of fruit-flavored tobacco, psychotropic WP, foods, drink, discounts, enjoyable settings, the proximity of WP cafe to the educational, public, sports, and home/residential settings, the opportunity to socialize with friends, tempting decoration, study places for students, live music, variety of games, and the possibility of watching live movie and sports [4, 21-23].

Despite the concerns about WPS outcomes as well as nearly three decades of controlling measures, the prevalence and popularity of new generation WP has been increasing in the world. Due to the unique nature of WP (multi-components), there has been rare evidence and actions to prevent and control it [24]. Thus, special rules are required to prevent and control WP [25]. WP business has remained uncontrolled, which may result in the increasing prevalence of WPS [26]. WPS is one of the main factors that can lead to the failure in tobacco control [27]. If evidence-based interventions are not implemented to control this re-emerging public health crisis, nearly three decades of advances in WPS control would be undermined [28]. This study aimed to identify the management and policy interventions which can be helpful in preventing and controlling WPS worldwide.

Methods
**Study Question**

What Policy and management interventions have been used for controlling and preventing WPS worldwide?

**Inclusion and exclusion criteria**

**Population:** The sample included WP consumers or people who are likely to be WP consumers in the near future as well as a defined population in a specific area.

**Intervention:** The intervention encompassed the activities, programs, or strategies in policy or management level aiming at preventing and controlling WPS, when instituting the practices or policies for WPS.

**Outcome:** The outcome was a categorized array of themes presenting a map of management and policy interventions which affect the prevention and control of WPS.

**Search strategy**

We searched PubMed, ISI Web of Science, Embase, Scopus, Science Direct, and Ovid databases from 1990 to August 2018 as well as the citation lists of the included studies and review articles. The first 10 pages of Google Scholar function, WHO, and World Bank websites were searched for the relevant studies. We used the key words of various synonyms separately including 32 terms of “Water pipe” in various culture, five synonyms of control terms, and 16 synonyms of interventions and policies. In addition, a combination of those words was used as the search terms. Appendix 1 provides the terms and the search strategy in PubMed.

**Quality Appraisal:**

According to the type of the included studies, the checklists of Joanna Briggs Institute (JBI) were adopted and used for quality appraisal. The studies were judged as high, moderate, or low quality. The quality of the examined studies was of moderate to high.

**Data extraction and management**

The data extraction parameters included author, year, country, design and study setting, method, participants, interventions, study duration, sample size, and main conclusions (appendix2). Identifying and categorizing the interventions were conducted by two researchers (G.A and L.D) independently.
Disagreements were solved by discussion.

**Data synthesis**

Content analysis was used for categorizing the management and policy interventions which influenced controlling and preventing WPS worldwide. Coding and categorizing was done by two researchers using the following process.

1. Reading the selected studies.
2. Identifying the interventions from the studies.
3. Categorizing the identified interventions into categories and sub-categories based on their conceptual similarity.
4. Placing themes in the related categories and sub-categories

The extracted interventions were organized and independently categorized by a second researcher (LD) to ensure consistency and accuracy. Disagreements were discussed among reviewers in order to reach an agreement. In case of disagreements, the identified interventions were placed in both categories.

**Results**

Four thousand three hundred fifty three studies were extracted based on the databases and manual searching processes. Out of 2228 screened articles (after removing duplicates), 38 articles were selected for the review through the screening process. PRISMA flow diagram was used to show the number of records in each phase (Fig. 1). The included studies were of moderate-to-high quality based on the checklists of JBI. The characteristics of the included studies are showed in (Appendix 1). The studies were published between 2008 and 2018. The studies were done in 19 different countries, including United States [4, 22–23, 29–38], United Kingdom [21, 39–43], Germany [6, 44], Iran [45–46], Egypt [47–48], Malaysia [49], India [50], Dutch [51], Pakistan [52], Qatar [53], Jordan [10], Lebanon [54], Syria [55], Turkey [56], Bahrain [57], Israel [58], United Arab Emirates [22], Saudi Arabia [59], and Switzerland [60]. They had applied cross-sectional, quasi-experimental, and qualitative design.

In this study, 78 management and policy interventions were identified as the influencing factors in WPS control. After combining the interventions with similar concepts, the total number of
interventions decreased to 26. Via content analysis, interventions were classified into two main categories: (1) management interventions and (2) policy interventions.

Management interventions were placed in two subcategories: (1) preventive interventions [6, 29, 31–33, 41, 45–47, 49, 51–53, 59–60] and (2) control interventions [21–23, 36, 39–40, 50, 61]. Policy interventions were placed in two subcategories (1) international level interventions [4, 22, 30, 34–35, 42–44, 48–49, 56, 58] and (2) national level interventions [10, 21, 23, 36–37, 51, 54–56, 61–62]. Management and policy interventions have been shows in Table 1.

### Table 1
The demographic characteristics of the study participants

| Title                  | Number | Percentage |
|------------------------|--------|------------|
| **Education**          |        |            |
| General physician      | 5      | 19.23      |
| Master                 | 4      | 15.38      |
| Bachelor               | 11     | 42.31      |
| Associate Degree       | 6      | 23.08      |
| **Total**              | 26     | 100        |

| **Work Experience**    |        |            |
| More than 25 years     | 4      | 15.38      |
| 20–24 years            | 6      | 23.08      |
| 15–19 years            | 5      | 19.23      |
| 10–14 years            | 4      | 15.38      |
| 5–9 years              | 3      | 11.54      |
| Less than 5 years      | 4      | 15.38      |
| **Total**              | 26     | 100        |

| **Workplace**          |        |            |
| Emergency Department   | 11     | 42.31      |
| City EMS headquarters  | 5      | 19.23      |
| EMS headquarters of the province | 10 | 38.48 |
| **Total**              | 26     | 100        |

| Code                                  | Subcategory Category | Code                                  | Subcategory Category | Code                                  | Subcategory Category |
|---------------------------------------|----------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|
| Unable to identify the deceased people | Identification problems | Workers’ concerns about their families | Lack of attention to the safety and security of the personnel’s family | Psychosocial support for the responders |
| Failure to effectively deal with the dead bodies | The challenge of dead body management | The importance of family status | Inadequate training of the paramedics and the lack of necessary skills | Unfamiliarity of the paramedics with the basics of triage |
| Failure to properly define the mission for the deceased | Not having a developed program | Authorities’ failure to support the responder’s families | Lack of EMS paramedics’ and officers’ individual preparedness | Lack of paramedics’ readiness to provide services in disaster |


| Carrying corpses instead of injured people with ambulances | Psychological disorders developing in the personnel | Lack of mental support |
|---------------------------------------------------------------|---------------------------------------------------|-----------------------|
| Not properly equipping the responders | Lack of equipment | Employees' fatigue because of large volumes of work |
| Lack of equipment in the early hours | Failure to deal with personnel problems after the disasters | Lack of organizational preparedness |
| Equipment disproportionate to geographic area | Lack of personal security | Low attention to the safety and security of the responders |
| Lack of basic relief supplies | Fear of showing up on the field and its impact on decision-making | Lack of readiness to confront the disasters |
| Failure to supply appropriate medication | Lack of support | Failure to perform specialized exercises (between organizations and between relief agencies) |
| Lack of triage tags | The difficulty of making decisions in the early moments | The difficulty of decision-making in emergency situations |
| Shortage of first-aid means | Simultaneously treating several patients | Lack of a disaster management room in EMS |
| Small number of ambulances in the early hours | Lack of access due to the severe destruction of the villages | The ordinary people disrupting the first responders |
| The number of ambulances being disproportionate to the mission volume in the first hours | The entrance of villages being obstructed | Lack of community preparedness |
| Ambulance's being disproportionate to the region | Lack of access to the areas in the early hours | Lack of familiarity of the residents with relief issues |
| Ambulance's not appropriate for disaster situations | Poorly-constructed regional roads | The local people's inability to perform proper triage |
| Lack of advanced facilities and ambulances | Poorly-constructed rural roads | |
| The impossibility of landing helicopters | Geographical conditions | |
| Inviting people to help the responders | Damage to the roads and bridges | The people's inability to perform medical first aids |
| People transferring the patients to health centers | Destruction of communication routes | |
| Community members rescuing and prioritizing the injured | Road traffic | Missalignments in missions |
| People dominating the management of the scene | Road closure | Lack of sectional coordination |
| The abundance of popular and organizational gifts | Failure to transfer experiences to other relief forces | Lack of experiences transferred to other relief forces |
| The existence of spontaneous help from the people | No lessons learnt from the past | Inconsistencies between pre-hospital and hospital emergencies |
| People's insistence on receiving services themselves | Failure to improve post-earthquake affairs | Uncoordinated forces' decisions |
| The influx of people and residents into health and | Not learning from this earthquake | Lack of full access to all the facilities available at the local level |
| Community relief | Non-therapeutic intervention in treatment | |
| Managing Volunteers and People's Aid | Challenges of people's presence on the scene | Lack of intra-sectional coordinations |
| Unfamiliarity of the organizations involved in responding | Lack of document actions | |
| Community donations | Uncoordinated management of ambulance services | |
| Suspension of measures after the change of management | Failure to act on the experiences of the Ahar-Haris incident | |
| The existence of spontaneous help from the people | Non-therapeutic intervention in treatment | |
| People's insistence on receiving services themselves | Challenges of people's presence on the scene | |
| The influx of people and residents into health and | Not taking advantage of past experiences | |
| Community relief | Uncoordinated forces' decisions | |
| Managing Volunteers and People's Aid | Failure to improve post-earthquake affairs | |
| Uncoordinated management of ambulances | Non-therapeutic intervention in treatment | |
| Community donations | Failures to act on the experiences of the Ahar-Haris incident | |
| Uncoordinated forces' decisions | Non-therapeutic intervention in treatment | |
| Community donations | Uncoordinated management of ambulance services | |
| Uncoordinated forces' decisions | Non-therapeutic intervention in treatment | |
| Community donations | Uncoordinated management of ambulance services | |
| Uncoordinated forces' decisions | Non-therapeutic intervention in treatment | |
| And service centers | Involvement of ordinary people in therapeutic measures and triage | Responding with each other’s tasks | Lack of coordination between the organizations |
|---------------------|---------------------------------------------------------------|-----------------------------------|-----------------------------------------------|
| The gathering of people and residents in health centers | Failure to record the response experience | Lack of coordination in supplying staffing needs | |
| Calling on all the ready forces Recall and management of volunteers | Disconnect from all sources of communication in the early hours Communication interruptions The challenge of communicating with earthquake-affected areas and between teams | Relief turmoil in the affected villages | Lack of unity of commands |
| Quickly sending donations from other provinces | Satellite phones not operating | |
| Deployment of forces from different routes Calling on and dispatch of forces | Difficulty of communication with the rescue teams Lack of communication equipment | Not offering a definition of responsibility to the forces | |
| Rapid deployment of responders from Tabriz center Cooperation and readiness of other provinces | Lack of communication equipment | |
| The arrival of auxiliary forces from neighboring cities | Lack of private communication systems | |
| High sense of responsibility among the personnel | High motivation to provide services | |
| Rapid arrival of equipment and assistance from Tehran | Lack of communication equipment in ambulances Dispersed information in the first minutes of the incident | |
| Fast delivery of equipment Lack of access to SMS | Results from communication problems Failure to perform an early initial needs assessment | |
| | | | |
Discussion
In this study, the policy and management interventions affecting the prevention and control of WPS worldwide were identified through a systematic review. According to the selected studies, the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) is a global treaty enacting the actions to control all tobacco products [63]. However, there has been rare focus on controlling cigarettes and WP-specific actions in the world, and it has been applied to some treaty articles [24, 64–65]. It is obvious that using the proposed actions by the FCTC to manage WPS can lead to a progress in WPS prevention and control. The study conducted by Erdöl et al. implies that the actions proposed by the FCTC were applicable on WPS and made significant reductions in WPS [56].
To prevent WPS, the previous studies focused on school-based educational interventions, especially first smoking in school students and adolescents, and education of community/society, which led to promising results in the prevention and control of WPS [6, 32–34, 46, 51–53, 59–60]. In a study conducted by Mason et al., it was found that most studies conducted on WPS involved the school students’ training [66] accompanied by counseling [66]. Nidal Eshah et al. showed that more than 70% of smokers begin WPS in adolescence [67]. The studies conducted by Aboaziza, Stamm-Balderjahn, and Tugay showed that many adolescents became dependent after the first use of WP, which made the quitting process to be extremely hard and the educational programs to be less effective [6, 68–69].
Lack of WPS control interventions among medical and nursing students and health care professionals can lead to failure in controlling WP, and health care professionals can play an important role in WPS control programs [10, 37, and 57]. Harvey and Phan Thu confirmed that health care professionals have a key role in WPS prevention and control [62, 70]. In a study conducted by Moyer VJP et al., health care professionals were found to be helping adolescents to change their behavior [71] using evidence-based counseling tools [62]. Similarly, Kumar et al. reported that the lack of WPS control programs among health care professionals can act as a positive vision to WP and cause low incentive to cooperate in WPS control programs [72–73].
Lack of proper interventions in WP industry such as packaging, labeling, advertising, fruit-flavored and
sweet tobacco, settings, and diversified services can lead to a failure in WPS control programs [4, 22–23, 30, 42, 44, and 48–49]. The previous studies show that fruit-flavored and sweet tobacco play main roles in the expansion of WPS in the world and act as the main barriers for WPS control programs; therefore, urgent measures are required to restrain this global problem [4, 74, and 77].

The study of Erdöl et al. in 2008 and 2012 in Turkey showed that proper warning labels can be more effective in WPS control [56]. Clear, intelligible, and evidence-based packaging and warning labels can accelerate the quitting and delay first smoking [21, 48, 78–79]. Social pages and websites are the main factors in promoting WPS among adolescents, proper interventions are needed to circumvent the bans, particularly in the advertising field [80–82].

Some studies suggest that evidences and investigations are needed to prevent and control WPS. Researchers and scientists, especially health experts, can help policymakers in developing and designing policy interventions to control WPS [24, 43, 83–84]. Lopez et al. found that evidences and studies related to WPS control are very rare, and more investigations are required in this respect [24]. Some other studies are related to the current interventions for the prevention and control of WPS that are old and incompatible with the various needs of the new generations of adolescents. They are poly users, occasional and social users and have fast access to new products via web – 3, 31, 49]. Designing control interventions compatible with their needs can be effective in controlling WPS. Despite WHO FCTC Article 6 on the taxation of all tobacco products, WP products are still tax-exempt. In fact, some studies reported that taxation is effective in controlling tobacco smoking [53–54, 65, and 85]. However, Jaam [53], and Maziak [86] showed that cheap or expensive prices may not be effective in controlling WPS. Several studies suggested that executive authorities have main roles in controlling WPS, and they should be supported by legislative enforcers and policy makers [21, 23, and 87].

Analysis of the literature showed that although the identified interventions affect WPS control, the absence of these interventions can increase the prevalence of WPS. National and global cooperation is needed to control this public health crisis in terms of various aspects, especially WP marketing.

Strengths And Limitations Of The Study
One limitation of this systematic review is that we only included WP meshes alone or in combination with smoking as the searching key words, and did not use smoking term separately. The purpose of our review was to identify specific studies on WPS, and searching the term “smoking” resulted in irrelevant studies. However, in specific studies of WPS, WP meshes were certainly used in their titles and abstracts or have just mentioned it.

Conclusion

Our findings indicate that governments are oblivious of this important social and health crisis, and the current poorly enforced legislations are old, unclear, and incompatible with the needs of adolescents. WP industry is expanding rapidly without monitoring and controlling measures. Informing and empowering interventions of community, especially in pre-school and school levels and adolescents for those who have not yet experienced smoking should be implemented. The main reason for this is that, after the first use, people become dependent, and the quitting process can be very demanding probably leading to the less effectiveness of policy and legislative interventions. WPS is on an upward trend among informed people, especially health providers. There is a need to design restrictive industrial interventions in the fields of marketing, packaging, labeling, fruit-flavored, and sweet tobacco and strengthen the cooperation among local, national and international parties in WPS research, industry monitoring, and strong implementation of legislations. Besides, empowering and involving health students and professionals in WPS control programs can lead to promising results in preventing and controlling WPS.

Abbreviations

WPS: Water Pipe Smoking; WP: Water Pipe; GDP: Gross Domestic Product; WHO: World Health Organization; FCTC: Framework Convention on Tobacco Control

Declarations

Ethics approval and consent to participate

This study reviewed and approved by Tabriz University of medical Sciences research ethical committee. Ethical code: IR.TBZMED.REC.1397.115

Consent for publication

Not applicable
**Availability of data and material**

All of the included papers are available in PubMed, ISI Web of Science, Embase, Scopus, Science Direct, and Ovid databases.

**Competing interests**

The authors state they have no conflict of interests to declare.

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**Authors’ contributions**

GA collected and reviewed the papers and analyzed and prepared the figures. LD contributed in designing, analyzing, and finalizing the paper. JB contributed in categorizing the factors, developing the framework, and reviewing, AA analyzed and edited the paper. LD critically revised the manuscript for important intellectual content. All authors read and approved the final version of the paper.

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Figures
Figure 1

Flow diagram of the search and screening process

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