



## Epidemiologic Pattern and Types of Oral Smokeless Tobacco Usage in Saudi Arabia

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### ABSTRACT

**Aim:** Smokeless tobacco (ST) use is a significant health risk and cause of disease. Most studies conducted in the Kingdom of Saudi Arabia (KSA) focused on cigarette smoking. Therefore, the objective was to study the epidemiologic pattern and types of oral ST usage in northern and western Saudi Arabia.

**Materials and methods:** A total of 428 volunteers living in three cities (Hail, Mecca, and Tabuk) were investigated. All of the study subjects were currently ST users of one type or more, including toombak, shammah, pan masala (PM), Afdhal, Nashooq, and others.

**Results:** Most of the study population were found to use toombak representing 127/428 (29.7%), followed by shammah, PM, Afdhal, Nashooq, Adani, Qat, Majun, and others, representing 67/428 (15.7%), 66/428 (15.4%), 44/428 (10.3%), 36/428 (8.4%), 32/428 (7.5%), 23/428 (5.4%), 22/428 (5.1%), 21/428 (4.9%), and 13/428 (3%) respectively.

**Conclusion:** This survey showed a high prevalence of existing ST usage among foreign workers and Saudis, which can establish a prospective public health problem.

**Clinical significance:** Smokeless tobacco cessation is a crucial element of tobacco control policy since it is the most important determinant of many diseases, including oral cancer.

**Keywords:** Kingdom of Saudi Arabia, Oral cancer, Pan masala, Shammah, Smokeless tobacco, Toombak.

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### INTRODUCTION

Smoking is estimated to cause 6.3 million deaths annually worldwide. The use of snuff, differing from smoking, has significantly increased, especially among the adolescents. Snuff powder contains 20-fold more nicotine compared with cigarettes, leading to strong nicotine addiction. Snuff causes oral mucosal changes, gingival recessions, and root surface caries. Smoking induces systemic low-grade inflammation, which weakens defensive immune responses in oral mucosa, gingiva, gingival crevicular fluid, and saliva.<sup>1</sup>

Smokeless tobacco consumption, which is widespread throughout the world, leads to oral submucous fibrosis (OSMF) and eventual oral cancer.<sup>2,3</sup> Commonly, OSMF is associated with multiple risk factors, especially ST and its components, such as betel quid, areca nuts, and slaked lime, which are used in pan and gutka.<sup>4</sup> Human oral epithelium cells experience carcinogenic and genotoxic effects from the slaked lime present in the betel quid, with or without areca nut. Products, such as 3-(methylnitrosamino)-propionitrile, nitrosamines, and nicotine initiate the production of reactive oxygen species in ST, eventually leading to fibroblast, deoxyribonucleic acid (DNA), and ribonucleic acid damage with carcinogenic effects in the mouth of tobacco consumers. The metabolic activation of nitrosamine in tobacco by cytochrome P450 enzymes may lead to the formation of N-nitrosornicotine, a major carcinogen, and micronuclei, which are an indicator of genotoxicity.

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These effects lead to further DNA damage, and eventually, oral cancer.<sup>2</sup>

### Toombak

In Sudan, oral snuff, known locally as toombak, is home-made from finely ground leaves of *Nicotiana rustica*, a tobacco species with a particularly high content of nicotine and minor alkaloids. Toombak contains unusually high levels of tobacco-specific nitrosamine compared with the reported levels in any snuff.<sup>5-7</sup> Several studies from Sudan have reported that toombak is a major risk factor associated with etiology of oral cancer in Sudan.<sup>8</sup>

### Shammah

This is a traditional form of chewing tobacco, a ST, that is commonly used in the Middle East, especially in KSA, Yemen, and Sudan.<sup>9</sup> Shammah usage has been associated with many oral mucosal lesions that may lead to development of oral cancer.<sup>10,11</sup>

### Pan Masala

Pan masala-containing tobacco was introduced in the Indian market during the 1970s. It is a mixture of areca nut, tobacco, lime, catechu, and spices.<sup>12</sup> Chewing of areca nut with or without tobacco is the predominant causes of oral cancer.<sup>13</sup>

Afdhal, Nashooq, Majun, and Adani are the other types of ST (snuff) that differ in their preparation and local names. Nasal snuff is not common in Arab countries, but when it is taken nasally it is called "nashooq" or that which is sniffed.

Qat (also known as Khat, Kat, and Miraa) is a green-leaved plant (*Catha edulis*) and is a psychostimulant plant that grows in countries bordering the Red Sea, along the East Coast of Africa, and in West Asia.<sup>14</sup> Although Qat is not regarded as a tobacco, Qat chewing may result in a number of changes in the oral mucosa and the dentition. The mechanical and chemical irritation may result in the development of mucosal white lesions and dark pigmentation. Khat chewing may reduce aspects related to the risk of gingival and periodontal inflammation, but it appears to be associated with attachment loss at the site of chewing.<sup>15</sup>

Foreign workers in KSA are estimated to be about 9 million as of April 2013.<sup>16</sup> Most of these foreigners are coming from Asia and neighboring Arab countries and bring with them their social habits. Of these habits are the use of different forms of ST. Therefore, the aim of the present study was to assess the epidemiological pattern and types of oral ST in relation to demographical characteristics.

## MATERIALS AND METHODS

This is a cross-sectional study, and data were obtained from 428 individuals volunteers living in three cities (Hail, Tabuk, and Mecca), KSA. Participants were randomly selected by simple random regardless of nationality, age, gender, and education level.

Purposeful questionnaire was designed and used for collection of the required data. The following information were obtained from each participant: Age, education level, resident, occupation, nationality, and tobacco types (toombak, shammah, PM, Nashooq, Majun, Adani, and Qat).

### Data Analysis

Statistical Package for the Social Sciences (version 16) was used for analysis and to perform Pearson chi-square test for statistical significance (p-value). The 95% confidence level and confidence intervals were used;  $p < 0.05$  was considered statistically significant.

### Ethical Consent

Each participant was asked to sign a written ethical consent during the questionnaire's interview. The informed ethical consent form was designed and approved by the Ethical Committee of the College of Medicine (University of Hail, KSA) Research Board.

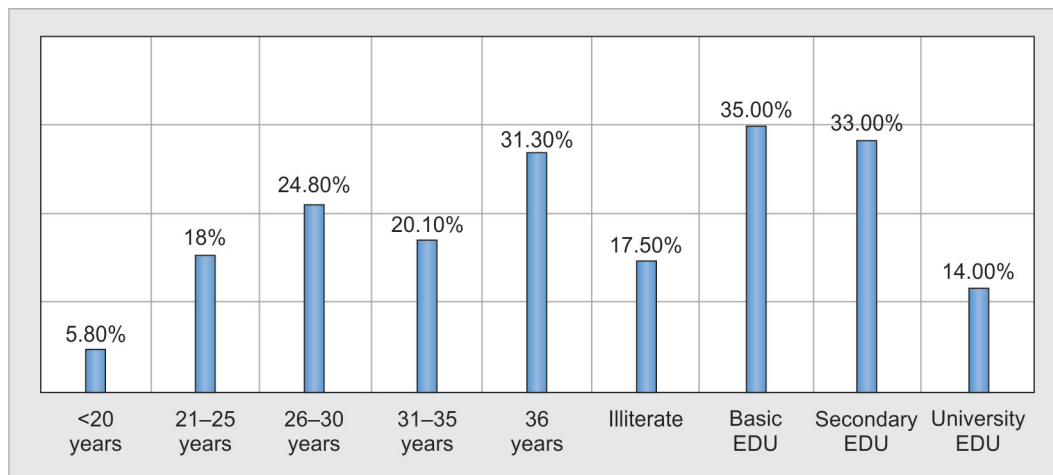
## RESULTS

This study investigated 428 ST users, their ages ranging from 15 to 56 years with a mean age of 32 years. All of the study subjects were males. The majority of the study subjects were at age group 36+ years representing 134/428 (31.3%) followed by 26 to 30, 31 to 35, 21 to 25, and <20 years constituting 106/428 (24.8%), 86/428 (20.1%), 11/428 (18%), and 25/428 (5.8%) respectively, as shown in Graph 1. With regard to the level of education, most participants were at basic level of education followed by secondary, illiterate, and university representing 150 (35%), 143 (33.4%), 75 (17.5%), and 60 (14%) respectively, as shown in Graph 1.

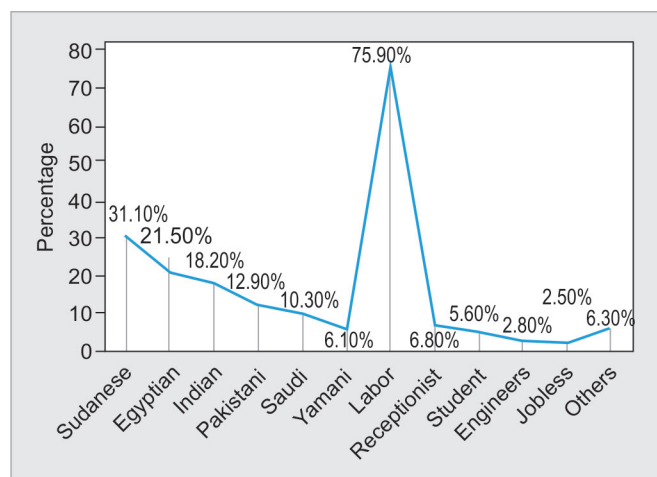
With regard to the nationality, most of the study subjects were Sudanese followed by Egyptian, Indian, Pakistani, Saudi, and Yamani, representing 133 (31.1%), 92 (21.5%), 78 (18.2%), 55 (12.9%), 44 (10.3%), and 26 (6.1%) respectively, as shown in Graph 2.

For occupation, most of the study subjects were labors followed by reception clerk, students, engineers, jobless, and others, representing 325 (75.9%), 29 (6.8%), 24 (5.6%), 12 (2.8%), 11 (2.5%), and 27 (6.3%) in this order, as shown in Graph 2.

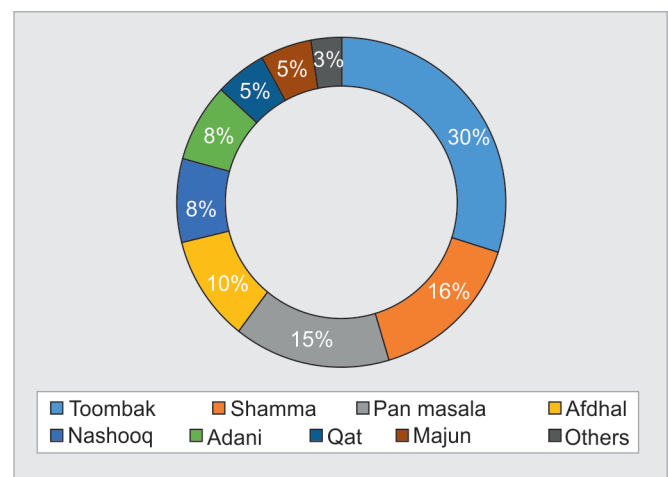
With regard to the type of tobacco usage, most of the study population were found to use toombak



**Graph 1:** Description of the study population by age and level of education



**Graph 2:** Description of the study population by nationality and occupation



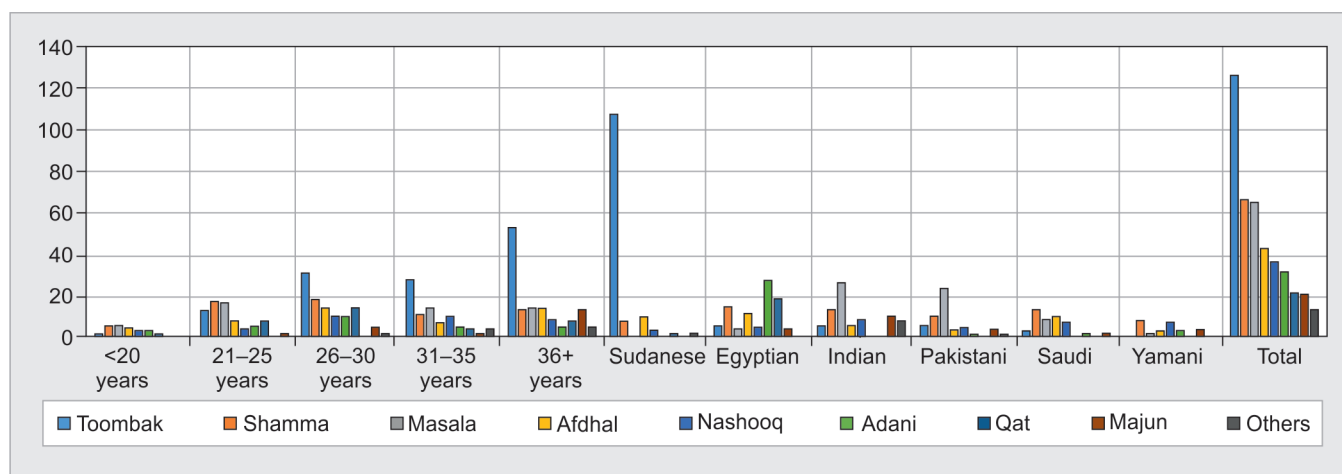
**Graph 3:** Description of the study population by tobacco type

representing 127/428 (29.7%), followed by shammah, PM, Afdhal, Nashooq, Adani, Qat, Majun, and others, representing 67/428 (15.7%), 66/428 (15.4%), 44/428 (10.3%), 36/428 (8.4%), 32/428 (7.5%), 23/428 (5.4%), 22/428 (5.1%), 21/428 (4.9%), and 13/428 (3%) respectively, as shown in Graph 3.

Table 1 summarizes the distribution of the tobacco type by age and nationality. The majority of toombak users were in the age range 36+ followed by 26 to 30, 31 to 35, and 21 to 25 years, representing 53/127 (41.7%), 31 (24.4%), 28 (22%), and 13 (10.2%) respectively. For shammah, the greater number was found among age

**Table 1:** Distribution of the tobacco type by age and nationality

Variable	Toombak	Shamma	Masala	Afdhal	Nashooq	Adani	Qat	Majun	Others
<b>Age (years)</b>									
<20	2	6	6	5	3	1	2	0	0
21–25	13	18	17	8	4	6	8	1	2
26–30	31	19	14	10	10	15	0	5	2
31–35	28	11	15	7	10	5	4	2	4
36+	53	13	14	14	9	5	8	13	5
Total	127	67	66	44	36	32	22	21	13
<b>Nationality</b>									
Sudanese	107	8	1	10	3	0	2	0	2
Egyptian	6	15	4	11	5	28	19	4	0
Indian	6	13	26	6	9	0	0	10	8
Pakistani	6	10	24	4	5	1	0	4	2
Saudi	3	13	9	10	7	0	1	0	1
Yamani	0	8	2	3	7	3	0	3	0
Total	127	67	66	44	36	32	22	21	13



Graph 4: Description of tobacco type by age and nationality

Table 2: Distribution of the tobacco type by education and occupation

Variable	Toombak	Shamma	Masala	Afdhal	Nashooq	Adani	Qat	Majun	Others	Total
<b>Education level</b>										
Illiterate	12	13	13	7	12	4	5	4	4	75
Basic	25	33	36	16	11	6	12	7	4	150
Secondary	70	13	11	16	8	17	3	9	5	143
University	29	8	6	4	5	5	2	1	0	60
Total	127	67	66	44	36	32	22	21	13	428
<b>Occupation</b>										
Jobless	2	3	0	2	1	0	1	0	1	10
Student	1	10	7	2	4	0	0	0	0	24
Labor	97	44	51	32	23	31	21	16	10	325
Receptionist	19	1	0	0	4	1	0	2	2	29
Engineer	2	4	3	0	2	0	0	1	0	12
Others	6	5	4	8	2	0	0	2	0	27
Total	127	67	66	44	36	32	22	21	13	

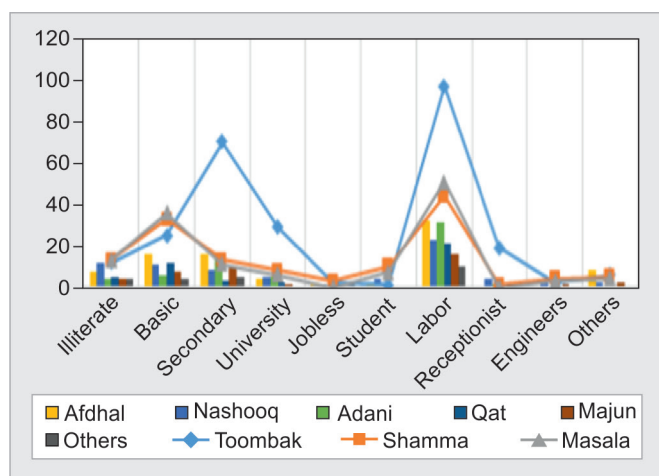
group 26 to 30 years, followed by 21 to 25, 36+, and 31 to 35 years, constituting 19/67 (28.4%), 18 (26.9%), 13 (19.4%), and 11 (16.4%) in this order. For PM, the greater number was found among age group 21–25 years, followed by 31 to 35, 26 to 30, and 36+ years, constituting 17/66 (25.8%), 15 (22.7%), 14 (21.2%), and 14 (21.2%) in this order. For Afdhal, the greater number was found among age group 36+ years, followed by 26 to 30, 21 to 25, and 31 to 35 years, constituting 14/44 (31.8%), 10 (22.7%), 8 (18.2%), and 7 (16%) in this order. For Nashooq, the majority of users were in the age range 26 to 30 and 31 to 35, followed by 36+ constituting 10/36 (27.8%) and 9/36 (25%) per capita. For Adani, Qat, Majun, and others, high frequency was found in 26 to 30 (46.9%), 21 to 25 and 36+ (36.4%), 36+ (62%), and 36+ (38.5%) respectively, as shown in Graph 4.

Regarding nationality, for Sudanese, toombak users represent the majority followed by Afdhal and shammah, representing 107/127 (84.3%), 10 (7.9%), and 8 (6.3%) respectively. For Egyptian, Adani users represent the majority followed by Qat and shammah, representing 28/92

(30.4%), 19 (20.6%), and 15 (16.3%) respectively. For Indian, PM users represent the majority followed by shammah and Majun, representing 26/78 (33.3%), 13 (16.7%), and 10 (12.8%) respectively. For Pakistani, PM users represent the majority followed by shammah and toombak, representing 24/55 (43.6%), 10 (18.2%), and 6 (10.9%) respectively. For Saudi, shammah users represent the majority followed by Afdhal and PM, representing 13/44 (29.5%), 10 (22.7%), and 9 (20.5%) respectively. For Yamani, shammah users represent the majority followed by Nashooq, representing 8/26 (30.7%) and 7 (26.9%) respectively, as indicated in Table 1 and Graph 4.

Table 2 summarizes the distribution of the tobacco type by education and occupation. The great majority were found among those accustomed to shammah and masala usage, followed by toombak and Nashooq, representing 13/75 (17.3%) and 12 (16%) in this order. For basic education level, most participants used masala followed by shammah and toombak, constituting 36/150 (24%), 33 (22%), and 25 (16.7%) respectively. For secondary education level, most participants used toombak followed by





**Graph 5:** Description of tobacco type by education and occupation

Adani and Afdhal, constituting 70/143 (49%), 17 (11.9%), and 16 (11%) respectively. For university education level, most participants used toombak followed by shammah and masala, constituting 29/60 (48.3%), 8 (13.3%), and 6 (10%) respectively, as shown in Graph 5.

With regard to occupation, for jobless, most participants used shammah followed by toombak and PM, constituting 3/10 (30%) and 2 (20%) respectively. For students, most participants used shammah followed by PM and Nashooq, constituting 10/24 (41.7%), 7 (29.2%), and 4 (16.7%) respectively. For labors, most participants used toombak followed by PM and shammah, constituting 97/325 (29.8%), 51 (15.7%), and 44 (13.5%) respectively. For receptionist, most participants used toombak followed by Nashooq, constituting 19/29 (65.5%) and 4 (13.8%) respectively. For engineer, most participants used shammah followed by PM, constituting 4/12 (33.3%) and 3 (25%) respectively. For others, most participants used Afdhal followed by toombak, constituting 8/27 (29.6%) and 6 (22.2%) respectively, as shown in Table 2 and Graph 5.

## DISCUSSION

In the present study, we tried to find the epidemiologic pattern of the different types of ST currently used in KSA. Several types were identified; some of which were known and practiced in some countries and some were only known by their local name ascertained by users. Some of the studied materials in the present study were considered as nontobacco products, but they were included due to its effects on oral cavity and neighboring ear nose and throat.

Although each tobacco type mentioned in this is known to be practiced in certain countries, it was found that some people from countries not related to that type of ST and practiced it. Although most of these ST types were not known to be made in KSA, Saudi people were found using them.

Toombak was the most common encountered ST reported in the present study, which was locally made and widely used in Sudan. Snuff dipping as practiced in North America and Western Europe is causally linked to the oral cavity and pharynx cancers. In Sudan, natives practice local *N. rustica*, a tobacco species with high levels of nicotine and nornicotine, to formulate specific snuff called toombak. The finely ground tobacco leaves are mixed with sodium bicarbonate, water is added, and a paste is made. The resulting "saffa" is placed in the oral vestibule and its leftovers up to some hours. In general, a saffa is replaced 10 to 30 times per day.<sup>17</sup> Toombak was found to be a major risk for the precancerous and cancer of the oral cavity.<sup>8,18</sup> In the present study, besides Sudanese, several nationalities were found to use it, including Egyptian, Indian, Pakistani, and Saudi. These users might have acquired the habit through their contact with the Sudanese.

Shammah is a traditional form of chewing tobacco, a ST, that is commonly used in the Middle East, especially in KSA and Yemen.<sup>9</sup> Shammah is a mixture of powdered tobacco, lime, ash, black pepper, oils, and flavorings. Shammah is placed in the buccal cavity or lower labial vestibule of the mouth. The user (or dipper) spits out insoluble debris. Smokeless tobacco is linked to a number of harmful effects, such as dental disease, oral cancer, esophagus cancer, and pancreas cancer. It also causes adverse reproductive effects including stillbirth, premature birth, and low birth weight. The importation of ST products is prohibited in KSA. Legislative action to combat the use of ST (moist snuff and chewing tobacco) in KSA appeared in 1990. The actual percentage use may be higher than reported since shammah is illegal in KSA and there may be some unwillingness to admit to its use.<sup>19</sup> There was strong evidence for a significant association between the prevalence of oral lesions (OL) and the daily duration of shammah application in a dose-dependent manner.<sup>20</sup> Shammah use is a major risk factor for oral cancer in Yemen.<sup>21</sup> Although shammah was commonly practiced in Yemen and southern KSA, most users in the present study were Egyptian followed by Saudi, as well as, Indian. However, we did not find any study reporting shammah usage in these countries.

Pan masala is a mixture of areca nut with slaked lime, catechu, and other flavoring agents. It is widely available and used by all the sections of the Indian society.<sup>22</sup> In India, a large number of tobacco users have altered their pattern of tobacco use after the gutka ban. Traditional gutka is sold in the open market in a premixed format. Manufacturers are supplying PM and tobacco in separate pouches as there is no restriction for sale of PM and tobacco individually in many states.<sup>23</sup> The odds of developing oral precancer even with consumption of PM

is high, even when it is consumed without tobacco.<sup>24</sup> In the present study, the great majority of the users were Indians followed by Pakistanis.

Afdhal is a harmful chewable tobacco, which is widely and easily available in small grocery shops throughout the Sultanate of Oman. The tobacco is placed between the gum and the side of the mouth, just under the molar tooth. When mixed with saliva, the tobacco produces a thick slime-like substance, which the user slowly swallows over a period of up to an hour.<sup>25</sup> However, there is a complete absence of literature regarding this type.

## Nashooq

Nasal snuff is not common in Arab countries, but when it is taken nasally it is called "nashooq" or that which is sniffed. Most commonly found to be practiced by Indians and Pakistanis. Adani and Majun were other forms of ST practiced by several nationalities in KSA. There is a lack of literature regarding their made and initiation places.

## Qat

Qat chewing is deeply rooted in the culture and tradition of communities in Qat belt countries, and its consumption is spread to other countries through the suitcase trade.<sup>26</sup> Although Qat was not consider as tobacco, we included it due to its similar effects to ST in the oral cavity. It was found that OL induced by chronic chewing of khat in the buccal mucosa present with white and brown discoloration due to increased epithelial thickness, increased keratinization, and melanin deposition.<sup>27</sup>

It was observed that in the present study most of the study subjects were at middle age, less educated, and the majority of them were working as labors.

## CONCLUSION

This survey showed a high prevalence of existing ST usage among foreign workers and Saudi nationals, which can establish a prospective public health problem. This survey also recognized several new forms of ST with a variety of formulates, which require further studies to identify its toxic ingredients. The results of the present study recommend that effective ST prevention and cessation intervention programs are needed to reduce the spread of usage among Saudi population.

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