

# National prevalence, perceptions, and determinants of tobacco consumption in Saudi Arabia

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## Abstract

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### Introduction

Tobacco use has been associated with many health risks that can lead to premature death. This study aims to assess the national prevalence of tobacco consumption and the associated determinants in Saudi Arabia.

### Methods

The study involved a cross-sectional national survey of 5175 individuals conducted across the 13 official regions of Saudi Arabia. The sample included individuals aged 18 years and above from both genders recruited using a quota sampling technique. Data collection was carried out between September 2018 and May 2019 through Web-based computer-assisted telephone interviews (CATIs). Participants were asked to report their current consumption of tobacco products including cigarettes, shisha (waterpipe), smokeless tobacco, cigars, pipes, and electronic cigarettes/vaping. Knowledge of specific health risks associated with smoking and public perceptions of the smoking phenomenon were also assessed among never smokers, smokers, and former smokers.

## Results

The national prevalence of tobacco consumption was 24.02% (1120/5175). Cigarettes were the most prevalent tobacco product consumed (16.18%; 95% CI: 14.5881–17.7663), and daily cigarette smoking prevalence was the highest (14.12%; 95% CI: 12.6433–15.5924). Shisha smoking prevalence was 8.12% (95% CI: 6.8054–9.4352). E-cigarette use prevalence was 2.22% (95% CI: 1.5770–2.8711). The most common tobacco product used among males was cigarettes (15.13%; 95% CI: 13.58–16.67), while shisha was commonly used among females (1.57%; 95% CI: 1.11–2.04). Cigarette smoking prevalence was the highest in the Aljawf region (21.12%; 95% CI: 17.07–25.18), shisha smoking prevalence was the highest in the Makkah region (12.41%; 95% CI: 8.64–16.17), whereas smokeless tobacco use was prevalent in the Najran region (4.75%; 95% CI: 2.81–6.70). Males (AOR: 8.17; 95% CI: 5.98–11.71;  $P < 0.0001$ ), young adults below 45 years of age (AOR: 2.12; 95% CI: 1.50–2.98;  $P < 0.0001$ ), and those with below a bachelor's degree (AOR: 1.34; 95% CI: 1.01–1.77;  $P = 0.0396$ ) were more likely to consume tobacco compared with others. The population mean knowledge scores of health risks associated with smoking among smokers was  $1.91 \pm 1.72$  (Range: 0–10), with the highest knowledge scores ( $2.16 \pm 1.68$ ) among former smokers. Only 46.53% (95% CI: 44.30–48.75) of the population are bothered “to very large extent” by smoking health consequences.

## Conclusions

Tobacco consumption is prevalent in Saudi Arabia. Different forms of tobacco use were reported, and the most common was cigarettes, followed by shisha and then electronic cigarettes. Tobacco use remains

one of the major threats to the health of the population in Saudi Arabia.

## Introduction

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Tobacco consumption is a global health epidemic and remains one of the most preventable and controllable health risks. About 15% of the world's population—over 1.1 billion individuals—smokes tobacco (1). In Saudi Arabia, the prevalence of smoking is 12.1% according to the latest national study conducted in 2015 (2). The most common consumed form of tobacco in Saudi Arabia is cigarettes; 21.4% of the population smokes cigarettes (3).

The tobacco epidemic is a major cause of preventable mortality and morbidity. The World Health Organization recognized smoking as one of the major behavioral risk factors of noncommunicable disease (4). The estimated global mortality attributed to smoking was 12% (5). Tobacco use is a major threat to the health of the Saudi population, as smoking is considered one of the leading causes of morbidity in the country (6). Research has found a significant association between smoking and the presence of chronic diseases in the Saudi population, which imposes a heavy disease burden, increases healthcare expenditure, and leads to preventable premature death (7,8).

Because tobacco consumption contributes to the future increase in chronic disease incidence, understanding national trends in prevalence and consumption is critical for prioritizing actions and evaluating tobacco-control initiatives in Saudi Arabia. This study aims to determine the prevalence of tobacco use in its various forms—including cigarettes, shisha (waterpipe), e-cigarettes/vaping, cigars, pipes, and smokeless tobacco—and associated sociodemographic factors across the 13

regions of Saudi Arabia. The secondary aim of this study is to assess the population's knowledge of health risks and public perceptions of tobacco consumption.

## Methods

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### Study design

This was a national cross-sectional survey conducted across the 13 main regions of Saudi Arabia. Data collection was carried out between September 2018 and May 2019 through Web-based computer-assisted telephone interviews (CATIs). The eligibility criteria were Arabic-speaking Saudi residents aged 18 years or older. Eligible participants proceeded with the phone interview to complete the study. The QPlatform data collection system was used to manage data collection, sampling, and sample size limit in each quota (9).

The research was reviewed and approved by the Saudi Food and Drug Authority Ethics Committee.

### Sampling and sample size

The quota sampling technique was used to achieve equal distribution of participants. The quota sampling was stratified by age, gender, and region based on the 2018 Saudi population (10). Based on gender, age, and region, 52 quotas were calculated with a total sample size of 5148.

### Participants and recruitment methods

The surveys were conducted mainly via Web-based CATIs via Sharik Association for Health Research (11). A list of random phone numbers was generated from the Sharik database (11). When quotas could not be filled by phone calls due to accessibility issues and cultural factors, participants were recruited through face-to-face interviews in public places. The proportion of the sample

size generated through face-to-face interviews was approximately 16% of the total sample.

### Questionnaire design

After providing verbal consent, participants were asked about their sociodemographic characteristics, such as age, gender, residence, highest level of education currently attained, marital status, employment status, and income. The primary variable was self-reported current tobacco consumption status of one of the following tobacco products: cigarettes, shisha, smokeless tobacco (chewing tobacco and moist snuff), cigars, pipes, and electronic cigarettes/vaping. Based on the current tobacco consumption status, participants were classified into three categories: smoker, former smoker, and never smoker. To assess participants' health status, respondents were asked to report any history of medical conditions diagnosed by a health professional (classified as healthy/no reported chronic condition, one condition, or two or more conditions).

Knowledge of risks associated with smoking was assessed among never smokers, smokers, and former smokers based on three questions: What are the diseases caused by smoking in nonsmokers? What are the diseases caused by smoking in smokers? What are toxic constituents of tobacco smoke? The respondents reported the answers they knew, and total score was calculated based on the correct answers.

Public perceptions of the smoking phenomenon were assessed among never smokers, smokers, and former smokers based on the following assessment items: To what extent does thinking about smoking consequences on health bother you? (response scale: very little extent, little

extent, to some extent, large extent, very large extent). What is your religious belief on the smoking phenomenon? (response scale: prohibited, detestable, permissible, recommended, do not know). How much are you convinced that smoking is a personal choice? (response scale: strongly convinced, convinced, somewhat convinced, not convinced, totally not convinced).

### **Data analysis**

Frequencies and percentages were used to measure tobacco consumption prevalence and cross-tabbed with sociodemographic factors. Percentages were based on weighted data. Logistic regression was used to examine the sociodemographic factors associated with tobacco consumption. The Statistical Package for Social Sciences (SPSS) version 25 and Statistical Analysis System (SAS) version 9.4 were used for data analysis.

### **Results**

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A total of 5175 individuals were surveyed across the 13 regions of Saudi Arabia. The median age of participants was 36.71 years (ages ranged from 18 to 88 years). Of the total sample, 76.42% reported having no significant medical illnesses. The weighted characteristics of the study population are presented in Table 1.

### **Prevalence of tobacco consumption**

The prevalence of tobacco consumption—which reflects reporting current tobacco consumption of any tobacco products—was 24.02% (95% CI: 22.1490–25.9004). Among the smokers population, 80.28% (95% CI: 76.7015–83.8532) consumed only one tobacco product (e.g., cigarettes only), 16.09% (95% CI: 12.8738–19.3131) consumed two tobacco products, and the remaining sample (3.55%; 95% CI: 12.8738–

19.3131) consumed three or more types of tobacco.

When tobacco consumption prevalence was measured by each tobacco product, cigarette-smoking prevalence was 16.18% (95% CI: 14.5881–17.7663) and shisha-smoking prevalence was 8.12% (95% CI: 6.8054–9.4352). E-cigarette/vaping use was reported by 2.22% (95% CI: 1.5770–2.8711) of the total population. Tobacco consumption prevalence is presented in more detail in Table 2.

### **Prevalence of tobacco consumption by sociodemographic characteristics**

Gender variations in tobacco consumption prevalence were found: About 21.13% of males consumed tobacco, compared with only 2.90% of females. The most common tobacco product used among males was cigarettes (15.13%; 95% CI: 13.58–16.67), while shisha was commonly used among females (1.57%; 95% CI: 1.11–2.04). More information on gender variations in smoking prevalence can be found in Table 2.

The highest tobacco consumption rate was found among those aged between 30 and 39 years (8.16%; 95% CI: 7.17–9.16), and the least was reported among those aged  $\geq$  50 years (2.68%; 95% CI: 1.75–3.60). More details on tobacco consumption prevalence by age groups can be found in Table 3.

Tobacco use was more prevalent among college-educated individuals (11.52%; 95% CI: 10.04–13.00) and lower-middle income individuals (10.26; 95% CI: 8.82–11.69) compared with others. More data on the prevalence of tobacco consumption by education level and income level are presented in Table 4 and Table 5.

Regional variations were found when data were separated by regions. Overall, the

highest prevalence of tobacco consumption was found in the Northern Borders region (28.65%; 95% CI: 23.46–33.83) and the lowest prevalence was found in the Asir region (13.89%; 95% CI: 10.44–17.33).

When prevalence was measured by tobacco products among regions, cigarette-smoking prevalence was the highest in the Aljawf region (21.12%; 95% CI: 17.07–25.18), shisha-smoking prevalence was the highest in the Makkah region (12.41%; 95% CI: 8.64–16.17), whereas smokeless tobacco use was prevalent in the Najran region (4.75%; 95% CI: 2.81–6.70).

### **Associated sociodemographic determinants of tobacco consumption**

According to logistic regression analysis, males (AOR: 8.17; 95% CI: 5.98–11.71;  $P < 0.0001$ ), young adults below 45 years of age (AOR: 2.12; 95% CI: 1.50–2.98;  $P < 0.0001$ ), and those with below a bachelor's degree (AOR: 1.34; 95% CI: 1.01–1.77;  $P = 0.0396$ ) were significantly more likely to consume tobacco compared with others.

### **Public perceptions of smoking**

The majority of the population (62.32%; 95% CI: 60.12–64.51) have a religious belief that smoking is prohibited. About 46.53% (95% CI: 44.30–48.75) of the population are bothered “to very large extent” by smoking health consequences; the highest rate was among never smokers (51.32%; 95% CI: 48.82–53.82) and the lowest among smokers (30.55%; 95% CI: 25.93–35.17). Only 22% (95% CI: 19.62–23.47) are “totally not convinced” that smoking is a personal choice, with the lowest rate among smokers (13.67%; 95% CI: 10.27–17.07) and the highest (27.42%; 95% CI: 18.74–36.09) among former smokers.

### **Knowledge of health risks associated with smoking**

The population mean knowledge score of health risks associated with smoking in nonsmokers was  $1.49 \pm 1.31$  (range: 0–6), with the highest mean knowledge score ( $1.76 \pm 1.21$ ) among former smokers and the lowest ( $1.28 \pm 1.17$ ) among smokers. The population mean knowledge score of health risks associated with smoking in smokers was  $1.91 \pm 1.72$  (range: 0–10), with the highest knowledge scores ( $2.16 \pm 1.68$ ) among former smokers. The most reported health risk associated with smoking was lung cancer. The population mean knowledge score of toxic constituents of tobacco smoke was  $0.70 \pm 1.10$  (range: 0–6). The most identified toxic constituent of tobacco smoke was nicotine (37.66%).

### **Abbreviations**

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E-cigarettes, electronic cigarettes; AOR, adjusted odds ratio; CI, confidence interval; CATIs, computer-assisted telephone interviews; SD, standard deviation.

### **Conflict of interest**

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The authors have no conflict of interest to declare.

### **Authors' contribution**

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Aljoharah M. Algabbani: Study design, analysis and writing. Nora A. Althumiri: Data collection. Nasser F. BinDhim: Conceptual Study design and supervision. Abdulrahman M. Almarshad project management. All authors have made substantial contributions to editing the manuscript.

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**Table 1. Sociodemographic characteristics of the participants (N=5175)**

<b>Sociodemographic characteristics</b>	<b>Categories</b>	<b>Mean</b>	<b>SD</b>
<b>Age (years)</b>		36.71(18-88)	11.19
		<b>N (%)</b>	<b>Wt. %</b>
	≤ 19	89 (1.7)	2.26
	20-29	1411 (27.3)	25.85
	30-39	1676 (32.4)	28.71
	40-49	1290 (24.9)	23.60
	≥ 50	709 (13.7)	19.58
<b>Gender</b>	Male	2606 (50.4)	60.26
	Female	2569 (49.6)	39.74
<b>Nationality</b>	Saudi	4646 (89.8)	88.07
	Non-saudi	478 (9.2)	10.65
	Refused to answer	51 (1.0)	1.27
<b>Education</b>	Primary school or less	251 (4.9)	4.81
	Elementary or high school	1284 (25.1)	26.80
	Diploma	445 (8.7)	8.01
	College education	2786 (54.4)	52.46
	Postgraduate education	359 (7.0)	7.93
<b>Employment</b>	Employed	3004 (58)	60.04
	Not employed	2171 (42)	39.96
<b>Marital status</b>	Currently married	1348 (26)	26.00

	Not currently married	3827 (74)	74.00
<b>Monthly income</b>	< 5,000 SR	1132 (22.1)	19.48
	5,000 to <11,000 SR	1709 (33.3)	30.11
	11,000 to <14,000 SR	519 (10.1)	8.53
	≥14,000 SR	799 (15.6)	21.21
	Refused to answer	966 (18.8)	20.68
<b>Regions</b>	Aljawf	402 (7.8)	1.45
	Northern Borders	394 (7.6)	1.07
	Tabuk	392 (7.6)	2.62
	Hail	398 (7.7)	2.12
	Almadinah	396 (7.7)	6.41
	Alqasim	403 (7.8)	4.36
	Makkah	406 (7.8)	26.82
	Al Riyadh	402 (7.8)	25.54
	Eastern Province	395 (7.6)	15.29
	Al Bahah	402 (7.8)	1.49
	Asir	400 (7.7)	6.55
	Jizan	393 (7.6)	4.60
	Najran	392 (7.6)	1.49
<b>Multimorbidity</b>	Healthy	4018 (77.6)	76.42
	One condition	781 (15.1)	16.35
	Two or more conditions	376 (7.3)	7.24
<b>Smoking status</b>	Never smokers	3727 (72.0)	69.2778
	Former smokers	328 (6.3)	6.6975
	Smokers	1120 (21.6)	24.0247



**Table 2. Tobacco consumption prevalence**

<i>Tobacco products</i>	Male			Female			Total		
	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI
<b>Cigarettes</b>	694	15.1268	13.5815 - 16.6721	70	1.0504	0.6800 - 1.4209	764 (14.9)	16.1772	14.5881 - 17.7663
<b>Shisha</b>	269	6.5494	5.3196 - 7.7793	84	1.5709	1.1058 - 2.0360	353 (6.8)	8.1203	6.8054 - 9.4352
<b>E-cigarettes/vaping</b>	88	1.9247	1.3018 - 2.5476	19	0.2994	0.1244 - 0.4744	107 (2.1)	2.2241	1.5770 - 2.8711
<b>Cigars</b>	46	0.5788	0.2746 - 0.8830	28	0.252	0.1138 - 0.3902	74 (1.4)	0.8307	0.4966 - 1.1649
<b>Smokeless tobacco</b>	51	0.2198	0.4981 - 1.3597	8	0.0169	0.0077 - 0.0738	59 (1.1)	0.9697	0.5376 - 1.4018
<b>Pipes</b>	2	0.02	0.0000 - 0.0494	4	0.1371	0.0000 - 0.3185	6 (0.1)	0.1571	0.0000 - 0.3409
<b>Overall*</b>	959	21.1256	19.2216 - 23.0296	161	2.8991	2.2670 - 3.5311	1120 (21.6)	24.0247	22.1490 - 25.9004

\*The “overall prevalence” reflects reporting current tobacco consumption of any tobacco product

**Table 3. Tobacco consumption prevalence by age group**

Tobacco products	≤19			20-29			30-39			40-49			≥50		
	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI
<b>Overall</b>	14	0.377	0.0634-0.6906	317	6.8389	5.9159-7.7618	434	8.1628	7.1687 - 9.157	256	5.9686	5.0817 - 6.8556	99	2.6773	1.7545 - 3.6001
<b>Cigarettes</b>	9	0.2487	0.0000-0.4986	215	4.7612	3.9223 - 5.6001	286	5.2374	4.3664 - 6.1085	188	4.4093	3.6081 - 5.2106	66	1.5205	0.8952 - 2.1458
<b>Shisha</b>	3	0.106	0.0000-0.2968	123	2.6615	1.9945-3.3285	132	3.0248	2.2683-3.7814	64	1.2052	0.7813 - 1.6291	31	1.1227	0.4133-1.8321
<b>E-cigarettes/vaping</b>	0	0	0.0000-0.0126	29	0.6956	0.3226-1.0685	46	0.9696	0.5379-1.4012	21	0.4202	0.1299 - 0.7105	11	0.1387	0.044-0.2334
<b>Cigars</b>	1	0.0043	0.0000-0.0126	21	0.2227	0.0375-0.4079	28	0.4138	0.1488-0.6788	17	0.1472	0.0702 - 0.2242	7	0.0427	0.0092 - 0.0762
<b>Smokeless tobacco</b>	1	0.0043	0.0000 - 0.0126	15	0.3211	0.078 - 0.5642	26	0.3663	0.0768 - 0.6557	15	0.2448	0.0431 - 0.4465	2	0.0332	0.0000-0.0888
<b>Pipes</b>	0	0	0	2	0.1304	0.0000 - 0.3116	1	0.0135	0.0000 - 0.0401	3	0.0131	0.0000-0.0293	0	0	0

**Table 4. Tobacco consumption prevalence by education level**

Tobacco products	Primary school or less			Elementary or high school			Diploma			College education			Postgraduate education		
	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI
<b>Overall</b>	35	0.4485	0.2501 - 0.6470	319	7.2699	6.0720 - 8.4678	124	2.144	1.5063 - 2.7817	525	11.5159	10.035 - 12.9967	69	1.6959	1.1195 - 2.2723
<b>Cigarettes</b>	25	0.3356	0.1679 - 0.5034	243	5.3202	4.3258 - 6.3146	96	1.8582	1.2389 - 2.4774	352	7.6315	6.4466 - 8.8164	48	1.0339	0.5896 - 1.4782
<b>Shisha</b>	9	0.1291	0.0189 - 0.2394	84	2.1662	1.4344 - 2.8981	37	0.5688	0.2675 - 0.87	200	0.6419	3.5681 - 5.6626	23	0.6419	0.2877 - 0.9960
<b>E-cigarettes/vaping</b>	3	0.0488	0.0000 - 0.1085	24	0.6664	0.2847 - 1.0482	19	0.343	0.106 - 0.58	54	0.9389	0.5176 - 1.3602	7	0.2551	0.0238 - 0.4864
<b>Cigars</b>	5	0.0264	0.0000 - 0.0550	25	0.3636	0.1204 - 0.6068	14	0.173	0.0076 - 0.3383	24	0.1784	0.0596 - 0.2972	6	0.0999	0.0000 - 0.2153
<b>Smokeless tobacco</b>	1	0.0035	0.0000 - 0.0103	21	0.4036	0.1193 - 0.6879	7	0.0854	0.0000 - 0.2054	29	0.4818	0.1719 - 0.7918	1	0.0077	0.0000 - 0.0228
<b>Pipes</b>	0	0	0	1	0.0048	0.0000 - 0.0142	0	0	0	5	0.1543	0.0000 - 0.3402	0	0	0

**Table 5. Tobacco consumption prevalence by monthly income level**

<i>Tobacco products</i>	< 5,000 SR			5,000 to <11,000			11,000 to <14,000 SR			≥14,000 SR		
	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI
<b>Overall</b>	193	4.6589	3.6239 - 5.6939	408	10.2545	8.8231 - 11.6859	122	2.8904	2.0843 - 3.6964	185	6.1997	4.8083 - 7.5911
<b>Cigarettes</b>	132	3.363	2.4587 - 4.2674	296	7.4729	6.2101 - 8.7357	80	1.8183	1.1953 - 2.4413	133	4.2455	3.1405 - 5.3504
<b>Shisha</b>	67	1.5607	0.9654 - 2.1561	135	3.5861	2.6635 - 4.5088	47	1.1349	0.6318 - 1.6380	60	2.1584	1.2600 - 3.0568
<b>E cigarettes/vaping</b>	17	0.2809	0.0695 - 0.4923	40	0.9615	0.4652 - 1.4577	12	0.3728	0.0800 - 0.6656	22	0.8881	0.3876 - 1.3886
<b>Cigars</b>	12	0.1073	0.0345 - 0.1801	35	0.5129	0.2029 - 0.8229	9	0.2264	0.0000 - 0.4667	6	0.1105	0.0000 - 0.2522
<b>Smokeless tobacco</b>	16	0.3018	0.0461 - 0.5576	21	0.3048	0.0925 - 0.5171	6	0.2182	0.0000 - 0.4967	6	0.0976	0.0000 - 0.1964
<b>Pipes</b>	2	0.0197	0.0000 - 0.0540	2	0.0844	0.0000 - 0.2385	1	0.0882	0.0000 - 0.2610	1	0.0082	0.0000 - 0.0244

**Table 6. Tobacco consumption prevalence by region**

Regions	Cigarettes			Shisha			E cigarettes/vaping			Smokeless tobacco			Cigars			Pipe			Overall		
	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI	N	Wt. %	95% CI
<b>Aljawf</b>	72	21.1223	17.0657 - 25.1788	21	5.7859	3.3577 - 8.2141	11	3.0421	1.2770 - 4.8072	1	0.2534	0.0000 - 0.7502	2	0.5212	0.0000 - 1.2439	0	0	0	90	25.9128	21.6946 - 30.1309
<b>Northern Borders</b>	69	19.2777	14.4341 - 24.1214	40	10.5333	6.8649 - 14.2016	8	1.8004	0.5697 - 3.0312	2	0.3231	0.0000 - 1.0848	12	3.7852	0.8403 - 6.7300	0	0	0	104	28.6462	23.4590 - 33.8334
<b>Tabuk</b>	62	16.9575	12.9542 - 20.9607	42	11.8187	8.2372 - 15.4001	9	2.2774	0.8249 - 3.7298	1	0.2464	0.0000 - 0.7296	7	1.8006	0.4498 - 3.1513	2	0.4275	0.0000 - 1.0270	97	26.6266	21.9641 - 31.2890
<b>Hail</b>	56	15.5126	11.4799 - 19.5454	21	6.4173	3.6535 - 9.1811	6	1.5272	0.1207 - 2.9336	2	0.5611	0.0000 - 1.3684	2	0.6942	0.0000 - 1.7934	0	0	0	73	20.1422	15.8272 - 24.4573
<b>Almadinah</b>	73	19.2525	15.2335 - 23.2715	34	9.7136	6.1476 - 13.2796	7	1.4504	0.3839 - 2.5169	4	1.087	0.0000 - 2.2156	7	1.4624	0.3706 - 2.5542	0	0	0	104	27.5661	22.7918 - 32.3404
<b>Alqasim</b>	48	14.6420	10.8043 - 18.4797	10	2.7209	0.9991 - 4.4426	4	1.0798	0.0000 - 2.1614	0	0	0	2	0.4811	0.0000 - 1.1378	0	0	0	65	18.9992	14.8883 - 23.1100
<b>Makkah</b>	61	15.6840	12.1932 - 19.1749	46	12.4076	8.6418 - 16.1734	12	2.7995	1.2004 - 4.3986	5	1.5085	0.1744 - 2.8426	2	0.5211	0.0000 - 1.2681	1	0.2289	0.0000 - 0.6777	111	28.32	23.6921 - 32.9479
<b>Al Riyadh</b>	58	16.9413	12.9945 - 20.8881	14	4.429	2.1118 - 6.7462	8	1.9654	0.5779 - 3.3529	2	0.4838	0.0000 - 1.1599	2	0.5171	0.0000 - 1.2459	1	0.2703	0.0000 - 0.8003	75	21.3744	17.1407 - 25.6081
<b>Eastern Province</b>	62	18.1077	13.7322 - 22.4833	29	9.2261	5.9205 - 12.5317	5	2.1036	0.2470 - 3.9602	2	0.5119	0.0000 - 1.2351	3	0.8598	0.0000 - 1.8483	0	0	0	85	25.6603	20.8014 - 30.5192
<b>Al Bahah</b>	74	20.0785	16.1610 - 23.9960	28	7.2177	4.4536 - 9.9819	10	2.9137	1.0152 - 4.8123	6	1.4758	0.2644 - 2.6873	14	3.7981	1.6859 - 5.9103	1	0.1301	0.0000 - 0.3852	103	26.9569	22.6235 - 31.2902
<b>Asir</b>	37	9.5613	6.5232 - 12.5995	15	3.8317	1.8594 - 5.8040	6	1.4992	0.2928 - 2.7055	5	1.3135	0.1859 - 2.4411	0	0	0	1	0.2065	0.0000 - 0.6114	56	13.8859	10.4425 - 17.3292
<b>Jizan</b>	51	13.3479	9.8280 - 16.8678	37	9.5522	6.4487 - 12.6557	15	4.1337	1.8445 - 6.4230	7	1.7197	0.3426 - 3.0968	13	2.479	1.1242 - 3.8338	0	0	0	89	23.033	18.6295 - 27.4365
<b>Najran</b>	41	10.5063	6.9911 - 14.0215	16	4.417	1.6623 - 7.1717	6	1.3224	0.2511 - 2.3938	22	4.7546	2.8137 - 6.6954	8	1.9188	0.5887 - 3.2489	0	0	0	68	16.2523	12.3757 - 20.1289

**Table 7. Beliefs and perceptions towards tobacco smoking**

<i>Assessment items</i>	Categories	Never smokers			Former smokers			Smokers			Total		
		Wt. %	95% CI		Wt. %	95% CI		Wt. %	95% CI		Wt. %	95% CI	
<b>To what extent does thinking about smoking consequences on health bother you?</b>	Very little extent	8.4546	6.9983	9.9109	10.9806	5.6839	16.2772	20.3422	16.2602	24.4241	11.1978	9.7046	12.691
	Little extent	3.0818	2.364	3.7996	5.5471	1.6901	9.4041	9.567	6.8283	12.3057	4.5783	3.7309	5.4257
	to some extent	11.8349	10.392	13.2777	10.4499	6.5618	14.338	17.7797	14.3832	21.1761	13.2067	11.8511	14.5622
	Large extent	25.3088	23.1661	27.4514	32.3404	23.5541	41.1268	21.7614	17.8744	25.6484	24.4902	22.6161	26.3642
	Very large extent	51.32	48.8153	53.8246	40.682	31.5714	49.7926	30.5498	25.9333	35.1664	46.5271	44.3016	48.7526
<b>Religious belief on smoking</b>	Prohibited	64.4057	61.9474	66.864	61.9057	59.6295	64.1819	55.3471	50.5675	60.1267	62.3155	60.1192	64.5118
	Detestable	28.0548	25.7816	30.3281	29.8041	27.6983	31.91	33.5806	29.1805	37.9806	29.3299	27.3073	31.3524
	Permissible	0.599	0.2878	0.9101	0.6842	0.3621	1.0062	0.9598	0.1375	1.7821	0.6822	0.3776	0.9869
	Recommended	0.0998	0.0117	0.1879	0.0806	0.0081	0.1531	0.0	0.0	0.0	0.0768	0.0091	0.1445
	Do not know	6.8407	5.4852	8.1961	7.5254	6.2252	8.8256	10.1125	6.9877	13.2374	7.5956	6.3438	8.8475
<b>How much are you convinced that smoking is a personal choice</b>	Strongly convinced	6.0865	4.9283	7.2446	10.0364	5.2685	14.8044	10.6515	7.9027	13.4003	7.1398	6.0385	8.2411
	Convinced	21.2731	19.217	23.3291	22.1145	14.0883	30.1408	31.3875	26.8911	35.8839	23.6069	21.7109	25.5028
	Somewhat convinced	12.1931	10.6584	13.7279	12.7169	7.2367	18.1971	16.8251	12.9403	20.7099	13.2619	11.7649	14.7589
	Not convinced	36.5393	34.0835	38.995	27.7152	20.1541	35.2764	27.4684	23.2236	31.7132	34.4462	32.3175	36.575
	Totally not convinced	23.9081	21.6443	26.1719	27.4169	18.7398	36.094	13.6676	10.2664	17.0687	21.5452	19.6168	23.4736

**Table 8. Knowledge of health risks of tobacco smoking and constituents of smoke**

Assessment items	Categories	Never smokers			Former smokers			Smokers			Total		
		Wt. %	95% CI		Wt. %	95% CI		Wt. %	95% CI		Wt. %	95% CI	
<b>Knowledge of specific health risks associated with smoking in others (nonsmokers)</b>	Lung cancer	48.0171	45.4245	50.6098	55.5644	46.5554	64.5734	38.6345	34.011	43.2579	45.763	43.4995	48.0265
	Respiratory disease	24.9802	22.715	27.2453	24.7646	16.769	32.7602	16.4394	12.9845	19.8944	22.9283	21.0108	24.8458
	Heart disease	22.4956	20.4238	24.5674	36.0972	27.3106	44.8838	28.6882	24.479	32.8975	23.9834	22.1073	25.8594
	Reproductive problems	1.7992	1.4092	2.1892	2.4378	0.4868	4.3888	2.0553	0.6539	3.4567	1.8607	1.4118	2.3097
	Low birth weight in babies	2.0412	1.5719	2.5105	2.1194	0.2988	3.94	1.0415	0.193	1.89	1.801	1.3916	2.2105
	Asthma	47.3222	44.7652	49.8791	54.1375	45.2312	63.0438	38.629	34.1222	43.1359	45.2337	42.9996	47.4678
	Do not know	23.0441	20.9457	25.1426	9.8102	5.2077	14.4126	29.7839	25.4905	34.0774	24.6634	22.7638	26.5629
	Total scores mean/SD *	1.546486	1.339966		1.759146	1.206472		1.276786	1.1701517		1.488116	1.309699	
<b>Knowledge of specific health risks associated with smoking (smokers)</b>	Lung cancer	87.3751	85.7555	88.9947	85.1323	83.5856	86.679	77.4967	73.7187	81.2747	85.0019	83.4598	86.5439
	Stroke	4.3671	3.5792	5.1551	3.5724	1.158	5.9868	2.934	1.822	4.046	4.0228	3.3724	4.6732
	Emphysema	19.4315	17.3278	21.5351	20.1112	11.8769	28.3455	14.2131	10.9737	17.4524	18.1778	16.395	19.9605
	Erectile dysfunction	2.3768	1.793	2.9607	4.1036	1.304	6.9031	3.1214	1.6582	4.5847	2.5557	1.9914	3.1201
	Pancreatic cancer	9.85	8.3671	11.3329	9.5227	8.2034	10.8421	8.2219	5.8709	10.5728	9.4589	8.2023	10.7154
	Mouth and throat cancer	23.3766	21.2464	25.5069	21.8046	15.3307	28.2784	19.6664	16.0999	23.2329	22.4853	20.6612	24.3094
	Diabetes	1.2521	0.9328	1.5713	1.1252	0.2974	1.9529	0.4937	0.2217	0.7657	1.0699	0.8202	1.3196
	Sudden cardiac death	5.0794	4.1389	6.0199	8.4014	4.1135	12.6893	7.4614	4.9812	9.9416	5.6517	4.72	6.5833

<b>Knowledge of toxic constituents of tobacco smoke</b>	Heart attack	14.9198	13.2362	16.6035	23.4181	15.8479	30.9883	17.9157	14.2688	21.5626	15.6396	14.0782	17.2009
	Peripheral vascular disease	8.8672	7.3778	10.3567	19.3987	11.4987	27.2988	11.2655	8.2043	14.3267	9.4434	8.1027	10.7841
	Do not know	6.2538	5.1835	7.324	6.4348	2.4579	10.4117	15.3054	12.1086	18.5022	8.4284	7.3002	9.5565
	Total scores mean/SD**	1.946239	1.769129		2.155488	1.676488		1.276786	1.1701517		1.907633	1.719949	
	Nicotine	34.6027	32.1783	37.0271	50.9342	41.7537	60.1147	47.3219	42.5772	52.0666	37.6585	35.4611	39.8558
	Tar and asphalt	10.671	9.116	12.2259	23.1469	15.1831	31.1107	21.3835	17.6458	25.1212	13.2446	11.764	14.7252
	Carbon monoxide	4.1881	3.4393	4.9368	10.1055	5.4584	14.7527	11.9976	8.9112	15.084	6.0643	5.1106	7.018
	Hydrogen cyanide	1.0902	0.8126	1.3679	1.7225	0.6887	2.7562	0.951	0.2279	1.674	1.0568	0.7849	1.3287
	Ammonia gas	1.0308	0.7165	1.3451	0.7783	0.1356	1.4209	0.7675	0	1.6172	0.9675	0.6537	1.2813
	Formaldehyde	0.9357	0.6779	1.1934	1.1239	0.2484	1.9994	0.6642	0.1491	1.1793	0.8705	0.6404	1.1006
	Do not know	62.6414	60.1846	65.0982	45.9982	36.9	55.0964	46.7293	41.9987	51.4599	59.3845	57.1692	61.5998
	Total scores mean/SD***	0.650062	1.097879		1.048781	1.213103		0.866964	1.0799901		0.697005	1.097569	

\* Scores = the total number of health risks correctly identified (range = 0 [poor] to 6 [good])

\*\* Scores = the total number of health risks correctly identified (range = 0 [poor] to 10 [good])

\*\*\*Scores = the total number of tobacco smoke constituents correctly identified (range = 0 [poor] to 6 [good])



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