



Prevalence of Smoking among Iranian Adults: Findings of the National STEPs Survey 2016

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Abstract

Background: Tobacco smoking is one of the most important avoidable causes of mortality from non-communicable diseases (NCDs). This study aimed to report the crude and standardized prevalence of current, ever, and secondhand smoking at national and provincial levels.

Methods: This study was performed through an analysis of the results of the STEPs survey 2016, which was conducted as a cross-sectional national study. The samples were selected via multistage cluster sampling and they were representative of general population aged ≥ 18 years in all provinces of Iran. All the data were analyzed via survey analysis while considering population weights. Age-standardized prevalence was also calculated for the Iranian national population in 2016 and the World Health Organization (WHO) Population 2000-2025.

Results: A total of 29963 subjects aged ≥ 18 years from all provinces of Iran, except for Qom, participated in this study. The age standardized prevalence of current tobacco smoking among adult males and females were 24.4% (95% CI: 23.6%–25.1%) and 3.8% (95% CI: 3.5%–4.1%), respectively. Among the participants, the majority of the current smokers were among those aged 45-54 years (14.5%; 95% CI: 13.6%–15.5%). With increase in age, the prevalence of secondhand smoking decreased to 34.8% (95% CI: 33.3%–36.7%) among people aged 18–24 years and to 22.6% (95% CI: 21.0%–24.3%) among subjects over 70 years.

Conclusion: The result of the study can be used to inform policy makers about the status of smoking and help them to design policies for setting rules on and limiting the import of cigarettes and their components to the country.

Keywords: Iran, Prevalence, Second hand smoke, Tobacco Smoking

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Introduction

Policy makers in both developed and developing countries need appropriate information about non-communicable diseases (NCDs) risk factors at national and sub-national levels.¹ Analysis of risk factors for poor health can provide information that facilitate the implementation of policies designed for prioritization, prevention, intervention, and control of NCDs.² Nevertheless, policy makers do not have access to enough reliable information about NCDs

risk factors in developing countries.³ The World Health Organization (WHO) has recommended countries to reduce the rate of death from four major NCDs including cardiovascular diseases (CVDs), respiratory diseases, diabetes, and cancers by around 25% by 2025 via reducing related risk factors, particularly smoking.⁴

Tobacco smoking is one of the most important avoidable causes of death from NCDs.⁵ As estimated, the smoking of tobacco and its derivatives is the leading cause of death in

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over six million people across the world annually. Moreover, it is predicted that by 2030, tobacco smoking will have led to 8.3 million deaths annually.⁶ According to the WHO, approximately 80% of mortality from tobacco smoking will occur in developing countries.⁷ Furthermore, about 4% and 13% of disability-adjusted life years (DALYs) in developed and developing countries, respectively, are attributable to smoking.^{8,9} Moreover, based on the results of a recent study, smoking is still one of the five major risk factors for increasing DALYs in 109 countries.²

To address the prevalence of smoking in populations living in Iran, so far a number of studies have sporadically investigated this topic.¹⁰ In one of the studies, the prevalence of smoking was estimated to be 12% (23.4% in males and 1.4% in females).^{11,12} None of the mentioned studies has addressed the prevalence of smoking among different age and sex groups in different provinces. To the best of our knowledge, the WHO has designed a STEPwise approach for the surveillance of risk factors such as smoking in different countries. The objective of this study is to provide a standardized method for obtaining reliable information on the crude and standardized prevalence of current, ever, and secondhand smoking at national and provincial levels, to help policy makers to build tools for the surveillance of diseases.

Material and Methods

Data Sources

This study was conducted through the analysis of the results of STEPs survey 2016 that was a cross-sectional national study carried out by the Non-Communicable Diseases Research Center (NCDRC). The samples were selected via multistage cluster sampling and they were representative of general population aged ≥ 18 years living in all provinces of Iran. Using information technology tools, the STEPs 2016 met the standards to achieve the highest level of accuracy in design, sampling, implementation, data collection, and data cleaning. The study had three main parts, as follows: first, interviewing the subjects and administration of the questionnaire; second; laboratory measurements; and third, physical and anthropometry measurement. Details on this survey are published in the study protocol.¹³

To assess the self-reported prevalence of smoking among the Iranian population, some questions were asked from the participants (e.g. “have you ever smoked?”, “have you ever smoked tobacco every day?”, “Have you already smoked tobacco?”, “do you smoke cigarettes every day”, “how many cigarettes do you smoke during the day?”, “at what age did you start smoking?”, “do you use hookah every day?”, “have you been exposed to smoking (smoked by other people) in your workplace during the past month?”, “have you been exposed to smoking by other people in your home during the past month?, and “how many days per week do you smoke at work in your office?”).

In order to assess the history of ever smoking, the

subjects were asked the following question: “have you ever smoked?” Those who negatively responded to this question were assumed as people who had never smoked. The prevalence of secondhand smoking was assessed through considering the responses to the last two questions. The positive responses were merged using “OR”.

Statistical Analysis

All the collected data were analyzed via survey analysis while considering the population weights. Age-standardized prevalence was also calculated based on the Iranian national population 2016 and the WHO Population 2000-2025 to yield comparable results for all the provinces. There were two weights for analyzing STEPs data, including questionnaires weight and laboratory weight. Since in this study we only used questionnaire data, the questionnaire weight was applied.

Results

Of a total of 30 541 subjects aged ≥ 18 to 100 years who participated in STEPs 2016, 29 963 subjects had a complete profile of smoking status (missing data was 1.9%). In total, 47.9% were male (Supplementary file 1, Table S1).

The crude prevalence of ever tobacco smoking in total population, in males, and in females aged ≥ 18 years was 21.1%, 7.0%, and 36.6%, respectively. The prevalence of ever cigarette smoking in females and males was 1.8% and 28.6%, respectively. The crude prevalence of current tobacco smoking in total adult population, males, and females was 14.2%, 25.2%, and 4.0%, respectively. The crude prevalence of current daily cigarette smoking was 10.1% (0.9% in females and 20.1% in males), which means 5 825 758 male individuals and 256 470 female individuals among the Iranian population are smoking cigarettes daily. The prevalence of secondhand smoking was 26.3% at home and 14.5% in workplace. In addition, the prevalence of secondhand smoking regardless of location was 31.5% among the adult population. The total prevalence of using hookah was 0.2% in general adult population (Table 1).

Furthermore, the crude prevalence of past smoking was 20.1% (6.5% among females and 35.0% among males). Moreover, the age-sex-standardized prevalence rates based on the Iranian population in 2016 are presented in Table 1.

Concerning the prevalence of ever smoking in rural and urban areas, the crude prevalence was 21.86% (20.99%–22.77%) in rural areas and 19.62% (19.06%–20.19%) in urban areas (Table S2). Furthermore, the prevalence of passive smoking in rural areas was 39.95% (38.87%–41.04%) and in urban areas was 28.60% (27.96%–29.25%) (Table S3).

The prevalence of current cigarette smoking increased from 2.3% in people aged 18–24 years to 14.5% in people aged 45–54 years and then decreased gradually to 8.4% in

Table 1. Crude and Standardized Prevalence of Smoking in the Iranian Population in 2016

Type of Smoking	Crude Prevalence			Age-Sex Standardized Smoking Prevalence Based on Iranian Population 2016						Age-Standardized Smoking Prevalence Based on WHO Population 2000-2025		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
	Never smoking	77.9% (77.4%-78.4%)	92.7% (92.3%-93.2%)	61.9% (60.9%-62.6%)	78.5% (78.0%-79.0%)	93.4% (93.0%-93.8%)	65.2% (64.4%-66.0%)	79.8% (79.3%-80.2%)	93.3% (92.9%-93.7%)	64.9% (64.0%-65.7%)		
Use of hookah	0.2% (0.2%-0.3%)	0.2% (0.1%-0.2%)	0.3% (0.2%-0.4%)	0.2% (0.2%-0.3%)	0.1% (0.1%-0.2%)	0.3% (0.3%-0.5%)	0.2% (0.2%-0.3%)	0.1% (0.1%-0.2%)	0.3% (0.3%-0.5%)			
Current tobacco smoking	14.2% (13.8%-14.6%)	4.0% (3.7%-4.4%)	25.2% (24.4%-25.9%)	14.1% (13.7%-14.5%)	3.8% (3.5%-4.1%)	24.4% (23.6%-25.1%)	13.6% (13.2%-14.0%)	3.9% (3.6%-4.2%)	24.3% (23.6%-25.0%)			
Current daily cigarette smoking	10.1% (9.7%-10.4%)	0.9% (0.8%-1.1%)	20.1% (19.4%-20.3%)	9.7% (9.4%-10.1%)	0.8% (0.7%-1.0%)	18.7% (18.1%-19.3%)	9.4% (9.1%-9.8%)	0.8% (0.7%-1.0%)	18.9% (18.2%-19.5%)			
Ever tobacco smoking	21.1% (20.7%-21.6%)	7.0% (6.6%-7.4%)	36.6% (35.8%-37.4%)	20.7% (20.3%-21.2%)	6.6% (6.2%-7.0%)	34.8% (34.0%-35.6%)	20.2% (19.8%-20.7%)	6.7% (6.3%-7.1%)	35.1% (34.3%-36.0%)			
Ever cigarettes smoking	14.6% (14.2%-15.0%)	1.8% (1.6%-2.0%)	28.6% (27.9%-29.4%)	13.8% (13.4%-14.2%)	1.5% (1.3%-1.7%)	26.1% (25.3%-26.8%)	13.6% (13.2%-14.0%)	1.6% (1.4%-1.8%)	26.8% (26.1%-27.5%)			
Past smoker	20.1% (19.7%-20.6%)	6.5% (6.1%-6.9%)	35.0% (34.2%-35.8%)	19.0% (18.6%-19.5%)	6.1% (5.7%-6.5%)	33.1% (32.3%-33.9%)	19.2% (18.75%-19.7%)	6.2% (5.8%-6.6%)	33.5% (32.7%-34.3%)			
Past daily smoker	13.6% (13.2%-14.0%)	1.4% (1.2%-1.6%)	26.8% (26.9%-27.5%)	12.2% (11.8%-12.6%)	1.2% (1.0%-1.4%)	24.2% (23.5%-24.9%)	12.6% (12.2%-13.0%)	1.3% (1.1%-1.5%)	24.9% (24.2%-25.6%)			
Secondhand exposure at work or home	31.5% (31.0%-32.1%)	27.7% (27.0%-28.4%)	35.7% (34.9%-36.5%)	32.7% (32.1%-33.2%)	28.3% (27.6%-29.0%)	37.0% (36.2%-37.9%)	31.9% (31.3%-32.4%)	28.1% (27.4%-28.9%)	36.1% (35.2%-36.9%)			
Secondhand expose at workplace	14.5% (14.1%-14.9%)	7.9% (7.4%-8.3%)	21.7% (21.1%-22.4%)	15.4% (15.0%-15.9%)	8.0% (7.6%-8.5%)	22.8% (22.1%-23.6%)	14.5% (14.1%-15.0%)	7.9% (7.5%-8.4%)	21.8% (21.1%-22.6%)			
Secondhand expose at home	26.3% (25.8%-26.8%)	26.6% (25.9%-27.3%)	26.0% (25.2%-26.7%)	27.0% (26.4%-27.6%)	27.1% (26.4%-27.9%)	26.8% (26.1%-27.6%)	26.7% (26.2%-27.2%)	27.0% (26.2%-27.7%)	26.4% (25.6%-27.2%)			

Table 2. Prevalence of Different Types of Smoking Among Age Groups

Age Groups	Gender	Never Smoking (%)	Current Tobacco Smoking (%)	Current Cigarette Smoking (%)	Ever Tobacco Smoking (%)	Ever Cigarettes Smoking (%)	Secondhand Smoking (%)	Use of Hookah (%)
18-24 years	Male	80.2 (77.7-82.4)	13.5 (11.6-15.6)	4.9 (3.8-6.4)	19.8 (17.6-22.3)	7.3 (5.9-9)	38.3 (35.5-41.1)	0.4 (0.2-1.1)
	Female	95.7 (94.5-96.6)	2 (1.4-2.9)	0.1 (0-0.5)	4.3 (3.4-5.5)	0.4 (0.1-0.9)	31.9 (29.5-34.4)	0.1 (0-0.5)
	Total	88.5 (87.2-89.7)	7.3 (6.3-8.4)	2.3 (1.8-3.0)	11.5 (10.3-12.8)	3.6 (2.9-4.4)	34.8 (33.03-36.7)	0.2 (0.1-0.6)
25-34 years	Male	68.4 (66.7-70)	22.5 (21.1-24)	14.6 (13.5-15.9)	31.6 (30-33.3)	19 (17.7-20.4)	41.2 (39.5-42.9)	1.1 (0.8-1.6)
	Female	94.1 (93.3-94.8)	3.3 (2.8-4)	0.5 (0.4-0.9)	5.9 (5.2-6.7)	0.8 (0.6-1.2)	28.7 (27.3-30.2)	0.1 (0-0.3)
	Total	82 (81-82.9)	12.4 (11.6-13.2)	7.2 (6.6-7.9)	18.0 (17.1-19.0)	9.4 (8.7-10.1)	34.6 (33.52-35.7)	0.6 (0.4-0.8)
35-44 years	Male	62 (60.2-63.8)	28.7 (27.1-30.3)	24.4 (22.8-26)	38 (36.2-39.8)	31.6 (29.9-33.3)	40 (38.2-41.8)	0.8 (0.5-1.2)
	Female	93.8 (92.9-94.6)	4 (3.4-4.8)	0.6 (0.4-1)	6.2 (5.4-7.1)	1.2 (0.9-1.7)	29.9 (28.4-31.5)	0.2 (0.1-0.4)
	Total	78.4 (77.4-79.4)	15.9 (15.0-16.9)	12.1 (11.3-13.0)	21.6 (20.6-22.6)	15.9 (15.0-16.8)	34.78 (33.6-36.0)	0.4 (0.3-0.7)
45-54 years	Male	56.5 (54.5-58.4)	32.7 (30.9-34.6)	29.2 (27.4-31)	43.5 (41.6-45.5)	38.7 (36.8-40.6)	34.3 (32.4-36.1)	0.3 (0.1-0.6)
	Female	92.5 (91.5-93.5)	5.1 (4.4-6)	1.3 (1-1.8)	7.5 (6.5-8.5)	1.8 (1.4-2.4)	27.3 (25.7-28.9)	0.3 (0.1-0.5)
	Total	75.4 (74.2-76.6)	18.2 (17.2-19.3)	14.5 (13.6-15.5)	24.6 (23.4-25.8)	19.3 (18.3-20.4)	30.6 (29.4-31.8)	0.3 (0.2-0.5)
55-64 years	Male	54.8 (52.6-57)	29.4 (27.5-31.5)	25.5 (23.7-27.5)	45.2 (43-47.4)	39.8 (37.7-42)	31.4 (29.4-33.4)	0.6 (0.3-1.1)
	Female	92.4 (91.2-93.4)	4.4 (3.6-5.4)	1.3 (0.9-1.9)	7.6 (6.6-8.8)	2.6 (2-3.4)	25.4 (23.6-27.2)	0.2 (0.1-0.5)
	Total	74.4 (73-75.7)	16.4 (15.3-17.6)	12.9 (11.9-14.0)	25.6 (24.3-27.0)	20.4 (19.2-21.7)	28.2 (26.9-29.6)	0.4 (0.2-0.6)
65-69 years	Male	62.4 (58.5-66.1)	20 (17-23.4)	17.7 (14.9-21)	37.6 (33.9-41.5)	33.1 (29.5-37)	24.2 (21-27.7)	0.8 (0.3-2.1)
	Female	90.5 (88.2-92.4)	4.5 (3.2-6.2)	1.3 (0.7-2.4)	9.5 (7.6-11.8)	3.9 (2.7-5.6)	23.2 (20.4-26.3)	0.7 (0.3-1.7)
	Total	77.8 (75.5-80)	11.5 (9.9-13.3)	8.7 (7.3-10.3)	22.2 (20.0-24.5)	17.1 (15.2-19.2)	23.6 (21.5-25.9)	0.8 (0.4-1.4)
70+ years	Male	64.5 (61.9-67.1)	16.8 (14.8-18.9)	13.9 (12.1-15.9)	35.5 (32.9-38.1)	28.7 (26.3-31.2)	23.8 (21.6-26.2)	1 (0.6-1.7)
	Female	88 (86-89.8)	5.3 (4.1-6.7)	2.2 (1.5-3.3)	12 (10.2-14)	5.1 (3.9-6.6)	21.2 (18.9-23.7)	0.4 (0.1-1)
	Total	75.6 (73.8-77.3)	11.4 (10.2-12.7)	8.4 (7.3-9.6)	24.4 (22.7-26.2)	17.6 (16.1-19.2)	22.6 (21.0-24.3)	0.7 (0.4-1.1)

people aged over 70 years. With increase in the participants' age, the prevalence of secondhand smoking decreased from 34.8% among people aged 18-24 years to 22.6% in people aged over 70 years (Table 2) (Supplementary file 2, Figure S1). The age trend of cigarette prevalence in Iran is shown in Figure 1. Furthermore, the status of current cigarettes smoking and past cigarette smoking among provinces in Iran by sex, 2016 are shown in Figures S2 and S3.

The mean number of cigarettes smoked per day in currently smoking subjects was 10.35 (9.87-10.83) cigarettes per day. Moreover, 24.1% (22.5%-25.7%) of the subject were smoking a maximum of five cigarettes per day, 23.1% (21.6%-24.7%) were smoking 6-10 cigarettes

per day, 8.3% (7.3%-9.4%) were smoking 11-15 cigarettes per day, 35.0% (33.2%-36.8%) were smoking 16-20 cigarettes per day, and 9.6% (8.5%-10.7%) were smoking more than 20 cigarettes per day.

The mean starting age of the participants for smoking was 21.56 (21.11-22.01) years in the general population, 21.25 (20.82-21.68) years in males, and 27.65 (24.14-31.15) years in females. Moreover, 10.1% (8.5%-11.9%) of the participants started smoking when they were under 15 years, 34.1% (31.6%-36.8%) at the age of 15-19 years, 46.1% (43.4%-48.9%) at the age of 20-30 years, and 9.6% (8.1%-11.4%) at the age of over 30 years.

Of those who smoked cigarette, 26.1% (24.6%-29.2%) had been smoking cigarettes for 12 months before the interview. Overall, 18.7% of the studied population had a history of quitting smoking for at least once (Table S4).

There was a significant difference between different provinces of Iran in terms of the prevalence of cigarettes smoking. The highest prevalence rates of current cigarette smoking were observed in West Azarbaijan with 14% (12.3%-16%) and Markazi with 13.7% (11.2%-16.7%) and the lowest prevalence rates were observed in North Khorasan with 4.7% (3.4%-6.5%) and Golestan with 5% (3.6%-7%) (Table 3).

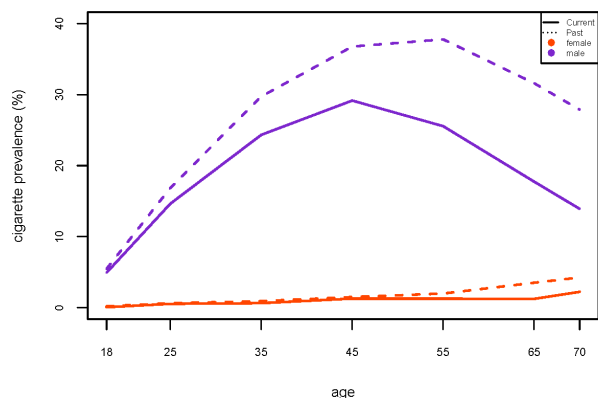


Figure 1. Age Trend of Cigarette Prevalence in Iran.

Discussion

This study, as a large national study, provided new reliable information about the prevalence of smoking among the

Table 3. Estimated Percentage (%) of Different Types of Smoking Prevalence Among the Iranian population in 2016 by Provinces

Provinces	Gender	Never Smoker (%)	Use Hookah (%)	Past Daily Cigarette (%)	Past Daily Tobacco (%)	Current Cigarettes Smoking (%)	Ever Tobacco Smoker (%)	Ever Cigarettes Smoker (%)	Second Hand Smoking (%)
Markazi	Male	93.9 (89.8-96.5)	0.4 (0.1-2.6)	1.6 (0.6-4.4)	5.5 (3.1-9.4)	0.8 (0.2-2.9)	6.1 (3.5-10.2)	1.6 (0.6-4.4)	33.1 (27.2-39.5)
	Female	59.2 (53.1-65)	0	33.6 (28.2-39.5)	39.2 (33.4-45.3)	26.7 (21.6-32.5)	40.8 (35-46.9)	35.7 (30.1-41.7)	52.9 (46.6-59.1)
	Total	76.6 (73-79.8)	0.2 (0-1.3)	17.6 (14.8-20.8)	22.3 (19.2-25.8)	13.7 (11.2-16.7)	23.4 (20.2-27)	18.7 (15.8-21.9)	43 (38.6-47.5)
Gilan	Male	98.6 (97-99.3)	0	0.5 (0.1-1.6)	1.1 (0.5-2.5)	0.2 (0.1-0.9)	1.4 (0.7-3)	0.5 (0.1-1.6)	15 (11.8-18.9)
	Female	66.9 (62.3-71.1)	0.5 (0.1-2.1)	26.4 (22.7-30.4)	31.5 (27.4-35.9)	21.7 (18.2-25.8)	33.1 (28.9-37.7)	28.2 (24.4-32.4)	25.2 (21.2-29.6)
	Total	82.7 (80.3-84.9)	0.3 (0.1-1.1)	13.4 (11.6-15.5)	16.3 (14.2-18.6)	11 (9.2-13)	17.3 (15.1-19.7)	14.4 (12.5-16.5)	20.1 (17.5-23)
Mazandaran	Male	96 (93.8-97.5)	0.2 (0-1.3)	0.5 (0.2-1.5)	3.5 (2.2-5.7)	0.5 (0.2-1.3)	4 (2.5-6.2)	0.8 (0.3-1.8)	23.9 (20.4-27.9)
	Female	60.7 (56.3-65)	0.8 (0.3-2.5)	25.3 (21.9-29.1)	36.8 (32.6-41.1)	19.5 (16.4-23.1)	39.3 (35-43.7)	27 (23.5-30.9)	29.7 (25.8-33.9)
	Total	78.4 (75.9-80.6)	0.5 (0.2-1.3)	12.9 (11.2-14.9)	20.1 (17.9-22.6)	10 (8.4-11.8)	21.6 (19.4-24.1)	13.9 (12.1-15.9)	26.8 (24.1-29.7)
East Azerbaijan	Male	98 (96.8-98.7)	0	1.7 (1-2.8)	2 (1.3-3.2)	1 (0.5-2)	2 (1.3-3.2)	1.7 (1-2.8)	25.1 (21.9-28.6)
	Female	68.7 (64.8-72.3)	0.1 (0-0.7)	26.5 (23.3-30)	31 (27.4-34.9)	21.5 (18.5-24.8)	31.3 (27.7-35.2)	27.3 (24.1-30.9)	33.3 (29.4-37.4)
	Total	83.3 (81.3-85.2)	0.1 (0-0.4)	14.1 (12.5-15.9)	16.5 (14.7-18.5)	11.2 (9.7-12.9)	16.7 (14.8-18.7)	14.5 (12.8-16.4)	29.2 (26.7-31.9)
West Azarbaijan	Male	95.1 (93-96.6)	0	2 (1.2-3.3)	4.2 (2.9-6.2)	1.1 (0.5-2.3)	4.9 (3.4-7)	2.8 (1.8-4.3)	42.1 (38.1-46.2)
	Female	52.9 (48.6-57.2)	1 (0.3-2.7)	37.4 (33.5-41.5)	45.3 (41.1-49.7)	27 (23.5-30.8)	47.1 (42.8-51.4)	40.1 (36.1-44.2)	50.2 (45.8-54.6)
	Total	74 (71.6-76.3)	0.5 (0.2-1.4)	19.7 (17.7-21.8)	24.8 (22.6-27.2)	14 (12.3-16)	26 (23.7-28.4)	21.4 (19.4-23.6)	46.2 (43.2-49.2)
Kermanshah	Male	96.5 (94.2-97.9)	0	1.5 (0.8-3.1)	3 (1.7-5.3)	1.2 (0.6-2.5)	3.5 (2.1-5.8)	1.8 (1-3.4)	24.9 (20.9-29.5)
	Female	72.3 (67.6-76.6)	0.6 (0.2-2.6)	22.2 (18.4-26.4)	27.1 (22.9-31.8)	17.1 (13.7-21)	27.7 (23.4-32.4)	22.7 (19-27)	34.7 (29.6-40.1)
	Total	84.4 (81.8-86.7)	0.3 (0.1-1.3)	11.9 (9.9-14.1)	15.1 (12.8-17.6)	9.1 (7.4-11.2)	15.6 (13.3-18.2)	12.3 (10.4-14.5)	29.8 (26.5-33.3)
Khuzestan	Male	97.3 (96-98.2)	0	0.7 (0.3-1.4)	2.6 (1.7-3.9)	0.3 (0.1-1)	2.7 (1.8-4)	1.1 (0.6-2)	31.9 (28.8-35.2)
	Female	69.7 (66.3-72.8)	0.8 (0.4-1.9)	22.4 (19.7-25.3)	29.1 (25.9-32.4)	17.8 (15.3-20.6)	30.3 (27.2-33.7)	24.1 (21.3-27.1)	43.1 (39.6-46.7)
	Total	83.5 (81.7-85.1)	0.4 (0.2-0.9)	11.5 (10.2-13)	15.8 (14.2-17.6)	9.1 (7.8-10.5)	16.5 (14.9-18.3)	12.6 (11.2-14.2)	37.5 (35.2-39.9)
Fars	Male	85.8 (83.5-87.8)	0.5 (0.2-1.1)	1.2 (0.7-2.1)	13 (11-15.2)	1.2 (0.7-2.1)	14.2 (12.2-16.5)	1.7 (1.1-2.7)	43.3 (40.1-46.5)
	Female	61.3 (57.8-64.7)	1.2 (0.6-2.2)	24.9 (22.2-27.7)	36 (32.7-39.5)	18.6 (16.1-21.4)	38.7 (35.3-42.2)	27.4 (24.6-30.4)	46.6 (43-50.2)
	Total	73.5 (71.5-75.5)	0.8 (0.5-1.4)	13.1 (11.7-14.5)	24.5 (22.6-26.5)	9.9 (8.6-11.4)	26.5 (24.5-28.5)	14.6 (13.1-16.1)	44.9 (42.5-47.3)
Kerman	Male	95.3 (93.2-96.8)	0.1 (0-0.9)	0.8 (0.3-1.7)	4.2 (2.8-6.2)	0.4 (0.1-1.1)	4.7 (3.2-6.8)	1 (0.5-2.2)	31.5 (27.7-35.6)
	Female	62.1 (57.9-66.1)	0.2 (0-1.7)	24.1 (20.9-27.5)	36 (32-40.1)	14.1 (11.6-17.1)	37.9 (33.9-42.1)	25.1 (21.9-28.6)	43 (38.6-47.5)
	Total	78.7 (76.4-80.8)	0.2 (0-0.8)	12.4 (10.8-14.2)	20.1 (18-22.4)	7.2 (6-8.8)	21.3 (19.2-23.6)	13.1 (11.5-14.9)	37.2 (34.3-40.3)
Khorasan-E-Razavi	Male	86.9 (84.8-88.8)	0.1 (0-0.6)	0.7 (0.3-1.2)	12.5 (10.7-14.5)	0.5 (0.2-1)	13.1 (11.2-15.2)	0.9 (0.5-1.5)	24.6 (22.1-27.3)
	Female	70.4 (67.5-73.1)	1.1 (0.6-2.1)	17.4 (15.4-19.7)	28.6 (25.9-31.5)	11.9 (10.2-14)	29.6 (26.9-32.5)	18.5 (16.3-20.8)	33.5 (30.5-36.7)
	Total	78.7 (76.9-80.3)	0.6 (0.4-1.1)	9 (8-10.2)	20.6 (18.9-22.3)	6.2 (5.3-7.2)	21.3 (19.7-23.1)	9.7 (8.6-10.9)	29.1 (27.1-31.1)

Table 3. Continued

Provinces	Gender	Never Smoker (%)	Use Hookah (%)	Past Daily Cigarette (%)	Past Daily Tobacco (%)	Current Cigarettes Smoking (%)	Ever Tobacco Smoker (%)	Ever Cigarettes Smoker (%)	Second Hand Smoking (%)
Isfahan	Male	94.4 (92.5-95.9)	0.2 (0-1.4)	1 (0.5-2)	5.4 (3.9-7.2)	0.5 (0.2-1.2)	5.6 (4.1-7.5)	1.5 (0.9-2.5)	30 (27.1-33.2)
	Female	59.2 (55.7-62.6)	1 (0.5-2)	27.3 (24.4-30.3)	39.7 (36.3-43.2)	20.8 (18.2-23.6)	40.8 (37.4-44.3)	29.2 (26.3-32.2)	43.6 (40.1-47.2)
	Total	76.8 (74.8-78.7)	0.6 (0.3-1.2)	14.2 (12.7-15.7)	22.5 (20.7-24.5)	10.6 (9.3-12.1)	23.2 (21.3-25.2)	15.3 (13.8-16.9)	36.8 (34.5-39.2)
S-O-B	Male	78.9 (74.8-82.5)	2.3 (1.2-4.4)	2.5 (1.3-4.6)	20 (16.5-24)	2.4 (1.3-4.3)	21.1 (17.5-25.2)	3.9 (2.4-6.3)	31.1 (26.8-35.7)
	Female	72 (67.2-76.3)	1.3 (0.5-3.3)	19.4 (15.8-23.7)	27 (22.7-31.7)	11.4 (8.5-15)	28 (23.7-32.8)	21.6 (17.6-26.1)	32.6 (28.3-37.5)
	Total	75.5 (72.4-78.3)	1.8 (1-3.1)	11 (9-13)	23.5 (20.7-26.5)	6.9 (5.3-8.9)	24.5 (21.7-27.6)	12.7 (10.6-15.3)	31.9 (28.7-35.2)
Kurdistan	Male	94.2 (91.1-96.3)	0.2 (0-1.2)	3 (1.7-5.4)	5 (3.1-8)	0.3 (0-2)	5.8 (3.7-8.9)	3.2 (1.9-5.6)	41.6 (35.9-47.6)
	Female	61.3 (55.4-66.8)	0.3 (0-1.7)	31.5 (26.6-36.8)	37.3 (31.9-43.1)	25.1 (20.4-30.6)	38.7 (33.2-44.6)	33.8 (28.6-39.4)	50.4 (44.2-56.5)
	Total	77.7 (74.4-80.7)	0.2 (0.1-0.9)	17.3 (14.7-20.1)	21.2 (18.3-24.4)	12.7 (10.4-15.5)	22.3 (19.3-25.6)	18.5 (15.9-21.5)	46 (41.8-50.3)
Hamedan	Male	94.9 (91.9-96.8)	0	1.3 (0.5-3.2)	4.9 (3-7.9)	0.3 (0-2.4)	5.1 (3.2-8.1)	1.3 (0.5-3.2)	43.8 (38.5-49.3)
	Female	56.8 (51.3-62.2)	0.6 (0.1-4.3)	31 (26.3-36)	40.9 (35.7-46.4)	20.9 (17.2-25.3)	43.2 (37.8-48.7)	32.5 (27.8-37.5)	47.9 (42.3-53.6)
	Total	75.9 (72.7-78.7)	0.3 (0-2.2)	16.1 (13.8-18.8)	22.9 (20.1-26)	10.6 (8.8-12.9)	24.1 (21.3-27.3)	16.9 (14.5-19.5)	45.9 (42-49.8)
Ch-O-B	Male	98.2 (96-99.2)	0	0.2 (0-1.6)	1.8 (0.8-4)	0.2 (0-1.6)	1.8 (0.8-4)	0.5 (0.1-1.8)	31.3 (26.6-36.4)
	Female	57 (51-62.7)	1.3 (0.4-4.3)	30 (25.2-35.2)	41 (35.4-47)	23.6 (19.2-28.5)	43 (37.3-49)	31.6 (26.7-36.9)	44.3 (38.6-50.2)
	Total	77.6 (74.4-80.4)	0.7 (0.2-2.2)	15.1 (12.7-17.8)	21.4 (18.6-24.6)	11.9 (9.8-14.4)	22.4 (19.6-25.6)	16 (13.6-18.8)	37.8 (34.1-41.7)
Lorestan	Male	91.7 (88.4-94.2)	0.2 (0-1)	0.3 (0.1-1.3)	6.3 (4.3-9.3)	0.2 (0-1.1)	8.3 (5.8-11.6)	0.5 (0.2-1.5)	32.7 (27.8-38.1)
	Female	64.5 (58.9-69.7)	1.2 (0.4-3.7)	25.7 (21.1-30.8)	33.1 (28-38.6)	19.3 (15.3-24)	35.5 (30.3-41.1)	27.5 (22.8-32.7)	38 (32.6-43.7)
	Total	78.1 (74.9-81)	0.7 (0.2-1.9)	13 (10.8-15.6)	19.7 (16.9-22.8)	9.7 (7.7-12.1)	21.9 (19.2-25.1)	14 (11.7-16.6)	35.4 (31.7-39.3)
Ilam	Male	97.7 (95.2-98.9)	0	1.8 (0.8-4.2)	2.3 (1.1-4.8)	0.3 (0-2)	2.3 (1.1-4.8)	1.8 (0.8-4.2)	26.4 (21.1-32.5)
	Female	73 (66.2-78.8)	0	18 (13.2-24)	25.4 (19.7-32)	10.3 (6.9-15.1)	27 (21.2-33.8)	18.6 (13.7-24.7)	49.6 (42.5-56.7)
	Total	85.3 (81.7-88.3)	0	9.9 (7.4-13.1)	13.8 (10.9-17.4)	5.3 (3.6-7.8)	14.7 (11.7-18.3)	10.2 (7.7-13.4)	38 (33.6-42.7)
K-O-B	Male	79.9 (74.9-84.2)	1 (0.2-3.7)	1.6 (0.6-4.2)	19.3 (15.1-24.2)	0.8 (0.2-3)	20.1 (15.8-25.1)	2 (0.9-4.7)	51.4 (45.5-57.2)
	Female	56.8 (50-63.3)	1.9 (0.8-4.5)	22 (17.2-27.6)	43.2 (36.7-50)	15.6 (11.7-20.6)	43.2 (36.7-50)	22.4 (17.6-28.1)	59.3 (52.5-65.9)
	Total	68.3 (64.1-72.3)	1.4 (0.7-3)	11.8 (9.4-14.8)	31.3 (27.4-35.4)	8.2 (6.2-10.8)	31.7 (27.7-35.9)	12.2 (9.7-15.3)	55.4 (50.8-59.8)
Houshehr	Male	80 (74.9-84.3)	0	1 (0.3-3.8)	18.9 (14.7-23.9)	2.7 (1.3-5.8)	20 (15.7-25.1)	2.7 (1.3-5.8)	31.4 (25.5-37.9)
	Female	67 (60.5-73)	1.6 (0.5-5.1)	14.3 (10.1-19.9)	31.9 (26-38.5)	14.3 (10.1-19.8)	33 (27-39.5)	16.8 (12.4-22.5)	40.4 (33.6-47.6)
	Total	73.5 (69.4-77.3)	0.8 (0.2-2.5)	7.7 (5.5-10.6)	25.4 (21.7-29.5)	8.5 (6.2-11.5)	26.5 (22.7-30.6)	9.8 (7.4-12.9)	35.9 (31.3-40.7)
Zanjan	Male	94.3 (91.5-96.3)	0	1 (0.4-2.5)	5.5 (3.6-8.4)	0.6 (0.2-1.9)	5.7 (3.7-8.5)	1.6 (0.8-3.4)	41.7 (36.8-46.7)
	Female	61.4 (56.3-66.2)	0.9 (0.3-2.8)	26.3 (22.3-30.9)	37.3 (32.5-42.4)	18.9 (15.3-23.1)	38.6 (33.8-43.7)	27.9 (23.8-32.5)	52.5 (47.4-57.5)
	Total	77.9 (75-80.5)	0.4 (0.1-1.4)	13.7 (11.6-16.1)	21.4 (18.8-24.3)	9.8 (8-11.9)	22.1 (19.5-25)	14.8 (12.6-17.2)	47.1 (43.6-50.6)
Semnan	Male	96.1 (93-97.8)	0	0.5 (0.1-3.5)	3.9 (2.2-7)	0.5 (0.1-3.5)	3.9 (2.2-7)	0.5 (0.1-3.5)	17.8 (13.6-23)
	Female	69.2 (62.2-75.5)	0.7 (0.1-4.7)	21.2 (16.1-27.4)	29.4 (23.3-36.3)	19.1 (14.2-25.2)	30.8 (24.5-37.8)	23 (17.7-29.4)	25.8 (19.8-32.7)
	Total	82.7 (78.8-85.9)	0.3 (0-2.4)	10.9 (8.3-14.1)	16.7 (13.5-20.4)	9.8 (7.4-13)	17.3 (14.1-21.2)	11.8 (9.1-15.1)	21.8 (18.1-26)

Table 3. Continued

Provinces	Gender	Never Smoker (%)	Use Hookah (%)	Past Daily Cigarette (%)	Past Daily Tobacco (%)	Current Cigarettes Smoking (%)	Ever Tobacco Smoker (%)	Ever Cigarettes Smoker (%)	Second Hand Smoking (%)
Yazd	Male	94.3 (90.6-96.5)	0	1.2 (0.4-3.7)	5.7 (3.5-9.4)	0.8 (0.2-3.6)	5.7 (3.5-9.4)	1.2 (0.4-3.7)	27.9 (23.3-33.2)
	Female	60.2 (54.6-65.6)	1 (0.3-3.4)	23.9 (19.8-28.6)	38 (32.7-43.6)	15.5 (12.1-19.7)	39.8 (34.4-45.4)	24.3 (20.1-29)	33.6 (28.5-39.1)
	Total	77.2 (74-80.2)	0.5 (0.1-1.7)	12.6 (10.4-15.1)	21.9 (18.9-25.1)	8.2 (6.4-10.4)	22.8 (19.8-26)	12.7 (10.6-15.2)	30.8 (27.3-34.5)
Hormozgan	Male	83.6 (79.1-87.2)	0	0.6 (0.1-2.3)	16.4 (12.8-20.9)	0.8 (0.2-2.4)	16.4 (12.8-20.9)	0.8 (0.2-2.4)	32.9 (27.7-38.5)
	Female	67.6 (61.8-72.9)	1.4 (0.5-4.2)	20 (15.9-25)	31.7 (26.4-37.5)	13.8 (10.3-18.3)	32.4 (27.1-38.2)	21 (16.7-26)	27.8 (22.5-33.7)
	Total	75.6 (72-78.9)	0.7 (0.2-2.1)	10.3 (8.2-12.9)	24.1 (20.8-27.7)	7.3 (5.5-9.6)	24.4 (21.1-28)	10.9 (8.7-13.5)	30.3 (26.6-34.3)
Tehran	Male	96 (95.1-96.8)	0.1 (0-0.4)	1.5 (1.1-2.1)	3.7 (3-4.6)	1.2 (0.8-1.7)	4 (3.2-4.9)	1.7 (1.3-2.3)	17.5 (16-19.2)
	Female	69.7 (67.8-71.6)	0.6 (0.3-1.1)	21.4 (19.8-23.1)	27.4 (25.6-29.3)	19.3 (17.7-20.9)	30.3 (28.4-32.2)	24.6 (22.9-26.4)	25.9 (24-27.8)
	Total	82.9 (81.8-83.9)	0.3 (0.2-0.6)	11.5 (10.6-12.3)	15.6 (14.6-16.6)	10.2 (9.4-11.1)	17.1 (16.1-18.2)	13.2 (12.3-14.1)	21.7 (20.5-22.9)
Ardebil	Male	98.3 (96.2-99.2)	0.3 (0-2.2)	1.4 (0.6-3.4)	1.7 (0.8-3.8)	0.7 (0.2-2.5)	1.7 (0.8-3.8)	1.9 (0.9-4)	34.8 (29-41.1)
	Female	64.6 (58-70.7)	0	29.5 (24-35.8)	34.8 (28.8-41.4)	22.6 (17.7-28.5)	35.4 (29.3-42)	30.1 (24.5-36.4)	51 (44-57.8)
	Total	81.4 (77.9-84.5)	0.2 (0-1.1)	15.5 (12.7-18.8)	18.3 (15.3-21.8)	11.6 (9.2-14.7)	18.6 (15.5-22.1)	16 (13.2-19.3)	42.9 (38.3-47.5)
Qazvin	Male	91.9 (87.2-95)	0	1.2 (0.4-3.8)	6.5 (3.9-10.8)	0.7 (0.2-3.1)	8.1 (5-12.8)	1.2 (0.4-3.8)	45.6 (39.3-52.1)
	Female	43.9 (37.5-50.5)	2.6 (1.1-6.2)	33.1 (27.4-39.4)	54.2 (47.6-60.6)	24.6 (19.6-30.5)	56.1 (49.5-62.5)	35 (29.1-41.3)	52.6 (46.2-58.9)
	Total	67.9 (64-71.5)	1.3 (0.5-3.1)	17.2 (14.3-20.5)	30.3 (26.8-34.1)	12.7 (10.1-15.8)	32.1 (28.5-36)	18.1 (15.2-21.5)	49.1 (44.6-53.6)
Golestan	Male	94.1 (90.9-96.2)	0	1.4 (0.6-3.4)	5.6 (3.5-8.7)	0.3 (0-2)	5.9 (3.8-9.1)	1.4 (0.6-3.4)	15.4 (11.8-19.7)
	Female	64.4 (58.4-69.9)	0	15.6 (12.1-20)	32.3 (27.2-38)	9.8 (6.9-13.7)	35.6 (30.1-41.6)	18 (14.1-22.6)	28.4 (23.5-33.8)
	Total	79.2 (75.9-82.2)	0	8.5 (6.7-10.8)	19 (16.1-22.1)	5 (3.6-7)	20.8 (17.8-24.1)	9.7 (7.7-12.1)	21.9 (18.8-25.3)
North Khorasan	Male	94.7 (92-96.6)	0	0.8 (0.3-2.2)	4.4 (2.7-6.9)	0.5 (0.1-2)	5.3 (3.4-8)	0.8 (0.3-2.2)	22.5 (18.3-27.3)
	Female	74.8 (70-79)	0	13.1 (10-16.9)	22.6 (18.5-27.4)	8.9 (6.4-12.3)	25.2 (21-30)	14.5 (11.2-18.4)	29.7 (24.3-35.8)
	Total	84.8 (82.1-87.1)	0	6.9 (5.4-8.9)	13.5 (11.3-16.1)	4.7 (3.4-6.5)	15.2 (12.9-17.9)	7.6 (6-9.7)	26.1 (22.6-30)
South Khorasan	Male	95 (91.9-97)	0.5 (0.1-2)	1.9 (0.9-4)	4.4 (2.6-7.3)	1.3 (0.5-3.1)	5 (3-8.1)	2.5 (1.3-4.7)	17.4 (13.5-22.2)
	Female	81.3 (75.8-85.7)	1.1 (0.3-3.7)	12.9 (9.3-17.5)	18.1 (13.8-23.5)	9.2 (6.2-13.3)	18.7 (14.3-24.2)	13.7 (10-18.5)	29.1 (23.4-35.5)
	Total	88.1 (85.1-90.6)	0.8 (0.3-2)	7.4 (5.5-9.9)	11.3 (8.8-14.2)	5.2 (3.7-7.4)	11.9 (9.4-14.9)	8.1 (6.1-10.7)	23.2 (19.7-27.2)
Alborz	Male	97.5 (95.6-98.6)	0	0.8 (0.3-1.9)	2.3 (1.2-4.2)	0.6 (0.2-1.7)	2.5 (1.4-4.4)	0.9 (0.4-1.9)	18.3 (14.9-22.2)
	Female	64.3 (59.4-68.9)	0.6 (0.1-2.2)	28.4 (24.4-32.9)	34.3 (29.8-39.2)	25.9 (21.9-30.4)	35.7 (31.1-40.6)	30.2 (26-34.8)	32 (27.4-36.9)
	Total	80.9 (78.3-83.3)	0.3 (0.1-1.1)	14.6 (12.6-16.9)	18.3 (16-20.9)	13.2 (11.2-15.5)	19.1 (16.7-21.7)	15.5 (13.5-17.9)	25.1 (22.3-28.3)

S-O-B, Sistan and Baluchestan; Ch-O-B, Chaharmahal and Bakhtiari; K-O-B, Kohgiluyeh and Boyer-Ahmad.

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Iranian population in 2016. We found that more than 15% of the Iranian population were currently smokers for all types of tobacco and a little less than one of ten Iranians were current cigarette smokers. In contrast, more than three-fourths of the Iranian population never smoked. Considering sex difference, apparently, there was a huge discrepancy between males and females in terms of the prevalence of smoking. Therefore, the prevalence of current cigarette smoking in males was about 20 times higher than that in females and it was 6 times larger in terms of current smoking. The prevalence of smoking in people aged 18 years and over in both sexes increased with aging and reached the peak in people aged 45-54 years old then decreased. The results of a study by Emami et al are consistent with our findings.¹⁴ Two systematic review studies in Iran reported the prevalence of current smoking which ranged from 0.6% to 9.8% among females^{15,16} and from 12.3% to 38.5% among males.¹⁶ In another systematic review in one of the northern provinces of Iran, it was reported that the pool prevalence of current smoking was 12.1% (23.4% among males and 0.9% among females).¹⁷ As reported by the WHO, the prevalence of current smoking was 11% in India, 17.5% in Saudi Arabia,¹⁸ 26.2% in Thailand and 26.9% in Turkey.¹⁹ Tobacco smoking imposes a huge economic burden on health systems in the world, and smoking control can decrease the cost and death rate of NCDs in communities.²⁰

We found that the mean number of cigarettes smoked by current cigarettes smokers was 10.3 per day. Taking into consideration the prevalence of current smoking and the population of Iran in 2016, it seems that more than 80 million cigarettes daily and about 30 billion cigarettes annually are smoked in Iran, i.e. 365 cigarettes per person in Iran.

Concerning secondhand smoking, about one third of the Iranian population are exposed to secondhand smoking; it is more than one third in males. However, such a difference between males and females was not observed in secondhand smoking at home. With increasing education levels and decreasing age, secondhand smoking decreased. Moreover, it is more prevalent in rural than urban areas. Nevertheless, second hand smoking had no relationship with income. This difference in the prevalence of smoking by education level and area of residence may be justified by higher levels of awareness among people with higher levels of education and among those who live in urban areas, as compared with those with lower education level and those living in rural areas. In a study in one province, the prevalence of passive smoking was estimated to be about 27.5%; it was more prevalent among females than males.²¹ Another study in Iran reported that the prevalence of passive smoking was 6.2% and 0.6% among males and female, respectively.²¹

Concerning smoking cessation, we found that during

the 12 months before the study, more than one fourth of the smokers had a history of quitting at least once. In STEPs 2016, the researchers did not ask about the rate of successful cessation of smoking. There was not a significant difference between the two sexes. Our results are in line with the rates reported by another study.²¹

According to the results of the study, some factors affected the variability of tobacco smoking prevalence in different provinces of Iran. We observed that the years of schooling and the levels of income were related to smoking rates. Along with the increase in education level among the participants of the study, tobacco smoking decreased. In addition, the residents of provinces with higher income levels were more likely to smoke. The examples are West Azarbaijan and Markazi provinces. Of course, the culture band and urbanization might be related to the inconsistencies in smoking prevalence among provinces.

In this study, we faced some limitations. As a potential limitation of this study, all data on the prevalence of smoking was collected through using a self-reported questionnaire without any biomedical marker. We reported the mean starting age of the participants for smoking in this study. However, it seems that our study faced potential biases such as recall bias because the participants of study might have forgotten the time of onset. In addition, the participants were older than 18, so the onset of smoking in this study might be reported higher than the reality. The main strength of this study was the use of a large sample size, which can be representative of all Iranian population. Moreover, our results showed the prevalence of smoking among all socioeconomic population groups such as the young and adults, educated and uneducated people, etc. Thus, we were able to determine important factors which influenced the prevalence of smoking in Iran. Furthermore, this study had very little missing data (less than 2%), because the required data were gathered by electronic and online tools. The program was designed in a way that led nobody to go to the next questions without giving a response to previous ones, hence the missing data was due to technical problems in transferring the data, and was not related to the lack of responses. Hence, we think the missing data were random. On the other hand, the sample size was calculated in a way to be 10% larger than the required sample size to address the missing data. Therefore, the missing data did not violate the generalizability of the data.

In conclusion, this study demonstrated the prevalence of several types of tobacco and cigarettes smoking patterns among the Iranian population. The results of the study can be used to inform policy makers about the status of smoking and help them to design policies for setting rules on and limiting the import of cigarettes and their components to the country. Furthermore, these results help them to identify high-risk population groups among all age groups, education levels, etc.

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Authors' Contribution

FF designed the study. MV, FSH, PM, ASH, SHJ, KG, MM, FP, NP, RH, AKH, and HZ collected the data. FSH, MV, PM, and ASH did the demographic analysis. FF, FSH, PM, ASH, and MV did the statistical analysis. MV and FSH wrote the first draft. FF, MV, FSH, PM, ASH, KG, SHD, AKH, HZ, NP, GHM, ARM, and FP interpreted the results. FF, MV, FSH, PM, ASH, GHM, MM, and SHD revised the final draft.

Conflict of Interest Disclosures

The authors have no conflicts of interest.

Ethical Statement

This study was approved by the Ethical Committee of National Institute for Medical Research Development (NIMAD) (ID: IR.NIMAD.REC.1394.032) and all the phases of the study were under the stewardship of ethical committee of this institute. An informed consent form was signed by all the participants before enrollment in the study.

Supplementary Materials

Supplementary file 1 contains Tables S1-S4 and Supplementary file 2 contains Figures S1-S3.

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