

## Prevalence and determinants of tobacco use (smoked and smokeless) among university students in Karachi: a cross-sectional study

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### ABSTRACT

#### Background:

Tobacco use among university students is an emerging public health concern in developing countries like Pakistan. Understanding the prevalence and determinants of both smoked and smokeless tobacco use is essential for developing effective prevention strategies.

#### Objective:

To assess the prevalence, patterns, and determinants of tobacco use among university students in Karachi.

#### Methodology:

A cross-sectional study was conducted over the 6-month period among 350 university students in Karachi using convenience sampling. Participants aged  $\geq 18$  years provided informed consent. Data was collected through a structured, self-administered questionnaire assessing demographics, tobacco use, social influences, cessation intentions, and awareness. Tobacco use patterns and cessation behaviors were dependent variables, whereas behavioral and demographic factors were independent variables. Data were analyzed using SPSS v24, with continuous variables expressed as mean  $\pm$  SD and categorical variables as frequencies and percentages.

#### Results:

Participants had a mean age of  $24.6 \pm 4.6$  years with balanced gender distribution. Most were from private universities and health sciences disciplines. The majority of tobacco use was occasionally occurring, with initiation often occurring between the ages of 18 and 21. Electronic cigarettes and smokeless tobacco were widely used. Many children were exposed to tobacco smoking among friends and family; thus peer influence and curiosity were important factors. Despite adequate awareness of health risks, many participants had attempted quitting and showed willingness to quit.

#### Conclusion:

Tobacco use among university students in Karachi is largely experimental and socially driven. Targeted interventions, including peer-led education, awareness campaigns, and stronger institutional tobacco control policies, are needed.

#### Keywords:

Tobacco use, University students, Smokeless tobacco, Cessation

### Introduction:

Tobacco use appears to be a major factor contributing to the global burden of non-communicable illnesses and one of the most important avoidable causes of morbidity and mortality. The World Health Organization estimates that tobacco smoking is linked to around 8 million death occurrences annually. The burden is also concerning in Pakistan, where tobacco smoking is responsible for 10–11% of all fatalities, underscoring its significant influence on public health (1).

Pakistan is one of the regions where tobacco use is very common. According to recent estimates, there are over 18.3 million tobacco users in Pakistan, with an adult smoking prevalence of about 11.6% in

2024(2). An estimated 19–20% of adults smoke tobacco, according to national data in certain circumstances, such as Pakistan. This number includes both smokeless and smoked tobacco products, indicating a significant tobacco use burden (3). According to global health data, the prevalence of smoking is far higher in men than in women, with male smoking rates frequently surpassing 20% and in some areas, 40%–50% while female consumption is still lower but is increasing in some areas, especially in emerging nations (4). There are two main categories of tobacco consumption: smokeless and smoking. Cigarettes, cigars, and shisha are examples of smokeless tobacco, whereas gutka, naswar, paan, and snuff are examples of smokeless tobacco. In Pakistan, national surveys reveal high

prevalence rates of smokeless tobacco (SLT) usage, which is a major public health concern. SLT products, such as naswar, gutka, and paan, are used by 7.7% to 8.6% of adults; consumption is much greater in men (up to 13.7%) especially in places like Khyber Pakhtunkhwa (5). Oral malignancies, periodontal disease, cardiovascular diseases, and respiratory ailments are among the negative health outcomes that are closely linked to both smokeless and smoked forms (6). Young adults are particularly prone to developing nicotine addiction since tobacco use usually begins in youth or early adulthood. Due to societal circumstances, smoking start frequently occurs at this stage in Pakistan. According to certain research, 13.7% of adolescents report smoking, while older students have significant experimenting rates (7). Additionally, 34% of people are still exposed to smoke from other people, which further normalizes youth tobacco usage (8). Although this transitional stage is associated to increased independence, academic stress, and peer pressure, all of which are known factors that contribute to tobacco use, university students constitute a crucial population in this context. Diverse socioeconomic backgrounds, convenient access to tobacco products, and the increasing popularity of alternatives such as smokeless tobacco and shisha influence the various consumption patterns found in cities such as Karachi. Despite this substantial burden, comprehensive data on smoking and smokeless tobacco use among university students in Karachi are lacking. Determining the prevalence and determinants of tobacco use in this demographic is essential for creating targeted prevention strategies and public health initiatives. Therefore, this study aims to assess the prevalence of smoked and smokeless tobacco use among university students in Karachi and to identify the socio-demographic, behavioral, and environmental factors associated with its use.

### Methodology

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**Date of Receiving: 2026-04-16**

**Date of Revision: 2026-04-22**

**Date of Acceptance: 2026-04-25**

**DOI: <https://doi.org/10.69491/381jcd90>**

A cross-sectional observational study was conducted over a period of six months to assess the prevalence and determinants of tobacco use among university students in Karachi, including both public and private sector institutions. Participants were recruited from undergraduate and postgraduate programs using a non-probability convenience sampling technique. Both tobacco users and non-users were included to enable comparison of prevalence and associated factors. The required sample size was calculated as 350 students using OpenEpi software, based on a reported smoking prevalence of 16.8% in the Jazan region, with a 95% confidence interval and a 5% margin of error (9). Students aged 18 years and above who were currently enrolled in a university and willing to provide informed consent were eligible for inclusion. Students who declined participation or submitted incomplete questionnaires were excluded.

Data were collected through a structured, self-administered questionnaire in English, distributed in online format after obtaining informed consent. The questionnaire consisted of five sections covering demographics, tobacco use behavior, social factors, cessation intention, and knowledge and awareness regarding tobacco use. Participants were assured of confidentiality and anonymity throughout the study, and data collectors were trained and supervised by the principal investigators to maintain data quality. No drugs or chemicals were used in this study. Independent variables included demographic characteristics (age, gender, university type, program, field of study, and GPA), social factors (peer or family tobacco use and passive smoking exposure), behavioral factors (reasons for initiation), and knowledge or awareness levels. Dependent variables included tobacco use status, type of tobacco used, frequency of use, and cessation intention or quit attempts.

Ethical approval for the study was obtained from the Institutional Review Board of LCMD (Ref. No. IRB/D-000205/26) prior to commencement. Participation was entirely voluntary, and written informed consent was obtained from all respondents. Data were entered and analyzed using SPSS version 24. Age was expressed as mean  $\pm$  standard deviation, while all other variables were treated as categorical data and summarized using frequencies and percentages. The analysis primarily focused on describing the prevalence and patterns of tobacco use among university students

### Results:

A total of 350 university students participated in the study. As shown in Table 1, most participants were male (52.3%), enrolled in private universities

(69.4%), and studying at the undergraduate level (57.4%). The majority belonged to Health Sciences

(60.3%), and most students reported a GPA/cGPA between 3.50 and 4.00 (61.4%).

**Table 1:** Demographic Characteristics of Study Participants

Demographic Characteristics		Mean ± SD	
Age (years)		24.6 ± 4.6	
Variable	Category	Frequency	Percentage (%)
Gender	Female	167	47.7
	Male	183	52.3
University Type	Private	243	69.4
	Public	107	30.6
Academic program	Postgraduate	149	42.6
	Undergraduate	201	57.4
Field of study	Arts/Humanities	95	27.1
	Business/Management	2	0.6
	Engineering/Technology	34	9.7
	Health Sciences	211	60.3
	Social Sciences	8	2.3
GPA/cGPA	2.00–2.74	26	7.4
	2.75–3.49	85	24.3
	3.50–4.00	215	61.4
	>4.00	24	6.9

Table 2 presents tobacco use patterns and related factors among participants. Overall, 6.3% had tried tobacco, while 5.1% were current tobacco users. Most respondents reported having close friends who used tobacco (62.6%), and 43.4% had family members who used tobacco. Curiosity/experimentation was the most common reason for initiation (59.4%), followed by stress relief (22.3%). Regarding cessation, 63.1% attempted to quit, and 66.0% were motivated to quit tobacco. In addition, most students recognized the harmful effects of tobacco on academic performance (66.0%) and health (90.9%), while 91.4% supported university-based tobacco awareness and cessation programs.

**Table 2:** Tobacco Use Patterns, Determinants, and Perceptions among University Students in Karachi

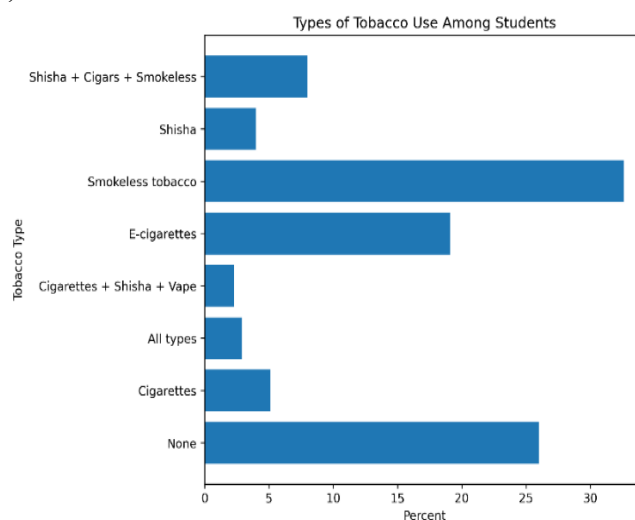
Variable	Category	n	(%)
Have you ever tried tobacco (any form)?	No	328	93.7
	Yes	22	(6.3)
Are you currently a tobacco user? (used at least once in the past 30 days)	No	332	(94.9)
	Yes	18	(5.1)
At what age did you first start using tobacco?	<10 years	16	(4.6)
	10–13 years	4	(1.1)
	14–17 years	75	(21.4)
	18–21 years	164	(46.9)
	22 years or older	26	(7.4)
How often do you currently use tobacco?	Daily	10	(2.9)
	No	4	(1.1)
	Occasionally (less than once a week)	334	(95.4)
	Weekly	2	(6)
	No	318	(90.9)

Are you exposed to passive smoking (second-hand smoke) at university, home, or social gatherings?	Yes	32	(9.1)
Do you have close friends who use tobacco?	No	131	(37.4)
	Yes	219	(62.6)
Any of your family members use tobacco?	No	198	(56.6)
	Yes	152	(43.4)
The main reason you started using tobacco	Curiosity/experimentation	208	(59.4)
	Family influence	14	(4.0)
	Peer influence	12	(3.4)
	Socializing/fitting in	38	(10.9)
	Stress relief	78	(22.3)
Have you ever tried to quit tobacco?	No	125	(35.7)
	Yes	221	(63.1)
Are you motivated to quit tobacco now	Maybe	67	(19.1)
	No	40	(11.4)
	Yes	231	(66.0)
Do you believe tobacco use affects academic performance (e.g., GPA, concentration)?	No	119	(34)
	Yes	231	(66)
Do you think tobacco use leads to serious health risks (e.g., cancer, lung disease, heart disease)?	No	32	(9.1)
	Yes	318	(90.9)
Should universities organize tobacco awareness and cessation programs for students?	No	30	(8.6)
	Yes	320	(91.4)

Characteristics expressed in frequency and percentages (%)



**Figure 1:** Bar graph showing the main reasons for initiating tobacco use among university students in Karachi.



**Figure 2:** Bar graph showing the types of tobacco commonly consumed among university students in Karachi

### Discussion:

The current study assessed the frequency and determinants of tobacco use (smoked and smokeless) among Karachi university students, emphasizing significant behavioral, social, and demographic correlations. The sample consisted of a slightly higher proportion of males (52.3%) compared to females (47.7%). This gender distribution is consistent with several regional studies from South Asia, where

tobacco use is generally more prevalent among men due to social acceptability and peer smoking conditions. Studies on university populations in Pakistan and nearby nations have revealed similar results, with male students routinely consuming more tobacco than female students. These findings represent enduring gender-based behavioral variations in drug use patterns (10, 11). In terms of institutional affiliation, a larger proportion of participants were enrolled in private universities (69.4%) compared to public universities (30.6%). The increasing number of private-sector students in urban educational research samples may be reflected in this pattern. According to earlier studies, tobacco consumption trends may vary depending on the type of university. Some evidence points to a higher incidence in private colleges because of increased socioeconomic flexibility and exposure to social smoking environments, although results are still inconsistent across studies (12). The field of study distribution revealed that a majority of participants were from Health Sciences (60.3%), followed by Arts/Humanities (27.1%), Engineering/Technology (9.7%), Social Sciences (2.3%), and a very small proportion from Business/Management (0.6%). Due to their greater accessibility and willingness to participate in research, health sciences students frequently predominate in university-based health behavior studies. However, prior research shows that health science students typically exhibit lower smoking prevalence and more understanding of tobacco-related dangers than students in non-health fields, however this isn't necessarily reflected in actual behavior because of stress-related coping methods (13). Academic performance data showed that the majority of students had a high GPA (3.50–4.00; 61.4%), followed by 2.75–3.49 (24.3%), 2.00–2.74 (7.4%), and >4.00 (6.9%). Previous research indicates that academic achievement and tobacco use are negatively correlated, suggesting that young individuals with worse academic performance are more likely to smoke and use smokeless tobacco (14). However, other recent research also shows that high-achieving students may continue to smoke for recreational, social, or stress-related reasons, suggesting that academic achievement by itself is not a protective factor (15).

Overall, the study's demographic distribution is consistent with previous regional and global research, indicating that an intricate relationship between gender, academic environment, field of study, and academic performance compared to a single factor

influences university students' tobacco use behavior. These findings highlight the need for targeted, discipline-specific, and gender-sensitive tobacco prevention strategies in university settings.

The majority of participants reported initiating tobacco use between 18–21 years (46.9%), followed by 14–17 years (21.4%). A smaller percentage started using it before age 14. These findings are consistent with data from South Asia and the Global Youth Tobacco Survey (GYTS) framework, which demonstrate that tobacco beginning typically occurs in late adolescence and the early university years (16). This period is characterized by increased autonomy, peer exposure, and psychosocial stress, which are well-established risk factors for experimentation and sustained use.

Regarding current usage patterns, an overwhelming majority (95.4%) reported occasional use (less than once per week), while daily use was relatively low (2.9%). This pattern indicates that the majority of tobacco use in this group is social or experimental rather than dependent. Similar patterns have been noted in research conducted at universities in Pakistan and other developing nations, where youth are more likely to use tobacco intermittently than older people are to smoke regularly (17). Curiosity or experimentation was the most frequent motivation for starting to smoke (59.4%), followed by stress reduction (22.3%) and fitting in/socializing (10.9%). These findings are consistent with prior studies in university populations, where curiosity and peer-driven experimentation are consistently identified as primary motivators. Stress-related initiation has also been widely reported, particularly among health science students, reflecting academic pressure and coping behaviors (18). A substantial proportion of participants (63.1%) attempted to quit tobacco, and 66.0% reported current motivation to quit. This is in agreement with previous research suggesting that although experimentation is common, many university students remain aware of health risks and express willingness to discontinue use (19). However, relapses and low sustained cessation rates are frequently observed due to social triggers and nicotine dependence. The highest percentage of use (32.6%) was for smokeless tobacco, which includes gutka, paan, naswar, betel quid, and related products. This is in accordance with previous research from Pakistan and South Asia, where smokeless tobacco use is very common because of its cultural acceptability, ease of access, and lower perceived harm when compared with smoked products. Similar results from nationwide surveys have shown that, although being a major public health concern, smokeless tobacco use is often disregarded in academic groups (20). Electronic

cigarette (vape) use was also notably high (19.1%), reflecting a growing trend among university students. This is consistent with previous regional and global research showing a rise in the use of e-cigarettes among young people, which is frequently motivated by ideas of less damage, contemporary appeal, and flavored goods. However, new research indicates that in many young populations, vaping may serve as a gateway to dual or poly-tobacco use rather than a help for quitting (21,22,24). Compared to smokeless tobacco and vaping, 5.1% of individuals reported using cigarettes exclusively. This pattern is consistent with recent epidemiological studies in urban Pakistani student populations, where cigarette smoking is increasingly being replaced or supplemented by alternative tobacco products, particularly among younger age groups (23,25).

### Limitations

This cross-sectional study cannot establish causality and relies on self-reported data, which may introduce reporting bias. The sample was mainly from private universities and health sciences, limiting generalizability. Additionally, detailed assessment of tobacco use patterns and psychological factors was not performed.

### Conclusion

University students in Karachi mostly smoke tobacco for experimental purposes, motivated by stress, peer pressure, and curiosity. Changing trends are highlighted by the growing usage of e-cigarettes and smokeless tobacco. Despite good awareness and quit motivation, continued use indicates the need for targeted tobacco control strategies in universities.

**Conflict of Interest:** The authors declare no conflict of interest.

**Funding:** Self-funded project.

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Conflict of interest: Author declares no conflict of interest.  
Funding Disclosure: Nil

**Author's Contribution:**

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**Yousuf Khanani** Data collection, literature review, drafting manuscript

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**Roja Ali Khan** Literature review, editing, proofreading

**Anjali Devi** Data collection, referencing, formatting

**Asma Imam** Data entry, coordination, proofreading



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