



# Tobacco Use Patterns Among University Students in Herat, Afghanistan: A Cross-sectional Study

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## Abstract

**Background:** Tobacco use is highly prevalent in Afghanistan, posing a significant challenge among young people, including university students. This study aims to investigate tobacco product usage patterns and associated factors among male students at Herat University, Afghanistan, addressing the critical need for understanding and addressing this public health issue.

**Methods:** In this cross-sectional study conducted between April and May 2021, 640 male university students were surveyed using interview-based stratified random sampling to assess cigarette, smokeless tobacco (ST), hookah, and e-cigarette use alongside sociodemographic factors. Logistic regression identified significant predictors.

**Findings:** The prevalence was 35.3% for cigarette smoking, 15% for ST use, 14.1% for e-cigarette vaping, and 35.5% for hookah smoking. In the cigarette model, predictors included age (OR=1.20), mother's education (secondary/high school OR=2.19; university OR=2.68), friends' use (OR=9.54), and employment status (OR=2.52). The hookah model highlighted friends' use (OR=31.05), marital status (OR=2.10), employment status (OR=1.76), and mother's education (secondary/high school OR=2.18; university OR=3.57) as predictors. In the ST model, predictors were friends' use (OR=20.12), employment status (OR=3.37), and mother's education (secondary/high school OR=2.91). Lastly, the e-cigarette model revealed the predictors of friends' use (OR=7.91) and employment status (OR=1.87).

**Conclusion:** Tobacco use among Afghan male university students is significantly influenced by peer behavior, employment status, and parental education. Interventions should target accessibility and sociocultural attitudes and include educational programs and policy measures to reduce tobacco consumption in the university setting.

**Keywords:** Tobacco, Smoking, Smokeless tobacco, Hookah, Electronic cigarettes, University students, Afghanistan

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## Introduction

The pervasive issue of tobacco consumption poses a persistent threat to global public health, contributing to a surge in preventable diseases and fatalities. Recent data from 2018 underscore the severity of this challenge, revealing that tobacco-related illnesses claimed the lives of over 7 million individuals worldwide in 2016 alone.<sup>1</sup> Alarming projections indicate a grim trajectory, with an anticipated 8 million annual deaths attributed to tobacco by 2030.<sup>2</sup> Despite declines in some developed nations, low- and middle-income countries bear the brunt of this crisis, harboring 80% of the world's 1.1 billion active smokers.<sup>1</sup>

Among the demographic groups most affected by the detrimental impact of tobacco is the cohort of adolescents and young adults. In the United States and the United Kingdom, the prevalence of cigarette smoking among this age group is reported at 20.8% and 22%, respectively.<sup>3,4</sup>

Even in Afghanistan, where progress has been made with a 20% reduction in smoking rates from 2010 to 2020, the prevalence persists at 23.3%.<sup>5</sup> This exceeds Iran's 13.6% and aligns closely with Pakistan's 20.2%, its neighboring countries.<sup>6,7</sup> The gravity of this situation cannot be understated, especially considering the crucial role early substance dependence plays in shaping the futures of young individuals. Thus, it becomes imperative to delve into the patterns of tobacco smoking and substance abuse, specifically among university students, a population particularly susceptible to these vices due to increased accessibility, peer pressure, and the myriad challenges associated with university life.<sup>8-11</sup>

Tobacco smoking and substance abuse have firmly established themselves within the university student demographic, as evidenced by numerous studies highlighting the perilous repercussions of their risk-taking



behaviors on their health.<sup>12-14</sup> The international academic landscape reflects the prevalence of cigarette smoking among university students, varying from 8.6% to 28.6%, influenced partly by divergent definitions and study locations.<sup>15-20</sup> Moreover, concerning trends in hookah smoking, a study in the United States indicated prevalence rates of 40.5%, 30.6%, and 9.5% for lifetime, past-year, and past-30-day use among college students, respectively.<sup>21</sup> Similarly, findings from Herat University during the republic government highlighted that 54.1% of female and 81.8% of male students were occasional or regular hookah smokers.<sup>22</sup> However, despite extensive research on tobacco and substance use among university students worldwide and the mentioned study at Herat University on hookah, no study has yet been conducted to assess tobacco smoking behavior specifically among Afghan university students.

Despite these alarming statistics, a significant knowledge gap persists regarding the extent of tobacco use among Afghan university students. This gap persists despite changes in government and policies aimed at curbing tobacco consumption. After the collapse of the republic government and the introduction of new policies against tobacco consumption, a comprehensive assessment is warranted. Thus, the primary objective of this study is to shed light on the prevalence of tobacco smoking and risk-taking behaviors, specifically cigarette smoking, hookah smoking, and smokeless tobacco (ST) use, among the student population of Herat University. This exploration will examine the factors influencing these behaviors, providing a nuanced understanding crucial for developing targeted interventions and policies in the context of the local student population.

## Methods

### *Study design, place, and duration*

This cross-sectional study was conducted from April to May 2021 among male students at Herat University in Herat city, Afghanistan. Herat University comprises sixteen schools, including three medical schools: Medicine, Stomatology, and Veterinary. Students are admitted to the university annually on August 5, following the entrance examinations.

### *Sample size*

The sample size for this study was determined using a formula that accounts for various factors such as the design effect, the proportion of the population with specific characteristics (in this case, physical and mental health problems), and the desired level of confidence. The formula employed for this calculation was:

$$n = \frac{z^2 p(1-p)}{e^2}$$

where  $n$  represents the sample size,  $z$  is the critical value for the desired level of confidence (in this case, 1.96 for a 95%

confidence level),  $p$  stands for the estimated proportion of the population with the specific characteristic of interest (in this instance, considered unknown and set at 0.5), and  $e$  represents the desired margin of error (0.04). After applying this formula, the minimum required sample size was calculated as 601. Given the total population size of 16,963, the sample size was adjusted for finite population correction using the formula:

$$n_{adjusted} = \frac{n}{1 + \frac{n-1}{N}}$$

where  $n_{adjusted}$  is the adjusted sample size,  $n$  is the previously calculated sample size (601), and  $N$  is the total population size (16,963). This adjustment resulted in a minimum sample size of 580 university students. To ensure representativeness at the school level, we employed a stratified random sampling strategy proportional to school size. Additionally, we included an extra 10% sample units, resulting in a final sample size of 640 participants.

### *Sampling procedures and eligibility criteria*

The study included all Herat University students enrolled in the first semester of 2023 who provided informed consent, were proficient in the Persian (Dari) language, and did not have any severe mental illness. The sampling frame was constructed using university attendance records, and the sample size was determined by dividing the total student population by the calculated sample size. The resulting figure was utilized as a benchmark to determine the number of samples, which were then randomly selected for each class. The study employed a stratified random sampling approach, considering each class a stratum. Data collection was carried out through face-to-face interviews with the participants.

### *Study instrument*

The 40-item questionnaire with five subscales aimed to gather information on various forms of tobacco and nicotine product usage, including traditional cigarette smoking (7 items), hookah use (7 items), ST (7 items), and electronic cigarette use (7 items), alongside collecting demographic information (12 items). A pilot test with 40 students was conducted before the main study. Cronbach's alpha values for internal consistency exceeded 0.7 for all items. Additionally, convergent and discriminant validity was confirmed with high correlation.

The sociodemographic subscale comprised questions regarding age category, residence type, marital status, employment status, economic status, accommodation, father's education, mother's education, father's job, mother's job, income, and school.

In this study, traditional cigarette smoking was assessed by categorizing respondents into five groups: non-smokers, experimenters (those who had smoked fewer than 100 cigarettes in their lifetime), occasional

users, regular smokers, and ex-smokers. The number of traditional cigarette users was then calculated based on these categories. However, when evaluating variables related to traditional cigarette smoking, respondents were grouped into two categories:

- Non-smokers: students who had never tried cigarettes, not even a single puff.
- Smokers: including experimenters, ex-smokers, occasional users, and regular smokers.

For logistic regression analyses, individuals who had smoked 100 or more traditional cigarettes during their lifetime were considered traditional cigarette smokers.

Hookah smoking was assessed using a question that included multiple response options: non-users, those who had only tried it, occasional users, monthly users, and weekly users. We subsequently calculated the number of hookah smokers based on these responses. Nonetheless, to analyze factors associated with hookah smoking, respondents were categorized into two groups:

- Non-hookah smokers: students who had never tried hookah, not even a single puff.
- Hookah smokers: including experimenters, ex-smokers, occasional users, and regular smokers.

For logistic regression analyses, students who used hookah at least once per month were considered hookah smokers.

ST usage was determined like traditional cigarette smoking. Respondents were categorized as non-users, experimenters (having used ST but not regularly), and regular ST users. For logistic regression analyses, individuals who were regular ST users were considered ST users.

Electronic cigarette (e-cigarette) use was assessed similarly to traditional cigarette smoking and ST usage. Respondents were categorized into non-users, experimenters, occasional users, and regular e-cigarette users. For logistic regression analyses, individuals who were regular e-cigarette users were considered e-cigarette users.

Furthermore, each of these four tobacco product subscales included inquiries on duration, initiation age, reason, and family and friend usage.

### Data analysis

In this study, we employed cluster sampling as the sampling method, which can impact the confidence intervals. Therefore, all analyses were conducted using survey analysis. The results section presents quantitative data as mean  $\pm$  standard deviation, while qualitative data are represented as frequencies (percentages). Univariate analyses involved the use of Fisher's exact and chi-square tests. For multivariate analysis, we employed a stepwise backward binary logistic regression model for each tobacco product, including only the significant variables from the univariate analysis, along with age and sex. Data analysis was performed using SPSS software version 26.

### Results

The study included 640 participants. The mean (SD) and median age of students were 21.92 ( $\pm$ 2.09) and 22.00 years, respectively. Age category, residence type, marital status, employed status, economic status, accommodation, father's and mother's education, father's and mother's job, income, and faculty were analyzed.

Most participants fell within the 21–25 age group (70.5%) and resided in urban areas (47.2%). Most were single (80.6%), with 33.3% reporting employment. Economic status varied, with 61.6% falling into the "average" category. Accommodation preferences included living with family (42.7%), dormitories (25.8%), personal homes (12.7%), or other arrangements (18.8%). Fathers were predominantly illiterate (51.1%), and mothers exhibited a similar trend (73.8%). A substantial portion of students' fathers (79.8%) were employed, whereas mothers' employment was less common (9.7%). Regarding income, 72.0% of participants reported an income of less than 2500; in terms of faculty distribution, 89.8% were from non-medical faculties (Table 1).

Table 2 outlines the participants' tobacco use patterns for cigarettes, ST, and hookah. Most participants had never used cigarettes (64.7%), ST (85.0%), e-cigarettes (85.9%), or hookah (64.5%). A smaller proportion had experimented with these products, with occasional and regular use reported at varying levels.

In Table 3, we assessed the relationship between demographic variables and cigarette and hookah smoking behaviors, and several noteworthy associations emerged. Marital status exhibited significant links with both cigarette and hookah smoking ( $P=0.026$  and  $0.005$ , respectively), with single individuals demonstrating higher usage rates. Employment status played a crucial role, indicating that non-employed participants had a significantly higher prevalence of tobacco use ( $P<0.001$  for both). Moreover, paternal and maternal education levels were identified as significant factors, with children of illiterate fathers ( $P=0.05$  for cigarettes and  $P=0.016$  for hookah) and mothers ( $P<0.001$  for cigarettes and  $0.001$  for hookah) showing increased tendencies to smoke. The influence of friends' tobacco use was substantial for both cigarette and hookah consumption, highlighting the role of peer pressure ( $P<0.001$  for both). Maternal employment status was found to be correlated with hookah smoking, with a higher proportion of students who did not smoke hookah having unemployed (homemaker) mothers ( $P=0.002$ ).

Additionally, accommodation type, mainly living in dormitories, was linked to an elevated use of hookah consumption ( $P=0.033$ ). Conversely, several demographic factors, such as economic status, type of residence (urban or rural), and father's job, did not exhibit significant associations with tobacco smoking. These findings underscore the intricate interplay of sociodemographic variables in shaping tobacco consumption patterns within

**Table 1.** Sociodemographic status of university students in Herat, Afghanistan

| Variable                  | n          | %            |
|---------------------------|------------|--------------|
| <b>Age category (y)</b>   |            |              |
| 17–20                     | 161        | 25.2         |
| 21–25                     | 451        | 70.5         |
| 26 and above              | 28         | 4.3          |
| <b>Marital status</b>     |            |              |
| Single                    | 516        | 80.6         |
| Married                   | 124        | 19.4         |
| <b>Economic status</b>    |            |              |
| Very good                 | 19         | 3.0          |
| Good                      | 103        | 16.1         |
| Average                   | 395        | 61.6         |
| Bad                       | 83         | 13.0         |
| Very bad                  | 40         | 6.3          |
| <b>Father's education</b> |            |              |
| Illiterate                | 327        | 51.1         |
| Primary school            | 64         | 10.0         |
| Secondary and high school | 132        | 20.6         |
| University                | 117        | 18.3         |
| <b>Father's job</b>       |            |              |
| Yes                       | 511        | 79.8         |
| No                        | 129        | 20.2         |
| <b>Income</b>             |            |              |
| Less than 2500            | 461        | 72.0         |
| More than 2500            | 179        | 28.0         |
| <b>Residence type</b>     |            |              |
| Urban                     | 302        | 47.2         |
| Rural                     | 338        | 52.8         |
| <b>Employment status</b>  |            |              |
| Yes                       | 213        | 33.3         |
| No                        | 427        | 66.7         |
| <b>Accommodation</b>      |            |              |
| With family               | 273        | 42.7         |
| Dormitory                 | 166        | 25.8         |
| Personal home             | 81         | 12.7         |
| Other                     | 120        | 18.8         |
| <b>Mother education</b>   |            |              |
| Illiterate                | 472        | 73.8         |
| Primary school            | 48         | 7.5          |
| Secondary and high school | 80         | 12.5         |
| University                | 40         | 6.3          |
| <b>Mother's job</b>       |            |              |
| Yes                       | 62         | 9.7          |
| No                        | 578        | 90.3         |
| <b>Faculty</b>            |            |              |
| Medical                   | 65         | 10.2         |
| Non-medical               | 575        | 89.8         |
| <b>Total</b>              | <b>640</b> | <b>100.0</b> |

the study population.

In Table 4, the relationship between demographic variables and the use of ST and e-cigarettes is examined. Several significant associations were identified in key categories. Employment status demonstrated a significant link with ST and e-cigarette use, with non-employed participants exhibiting a higher prevalence of both ST and e-cigarette consumption ( $P < 0.001$  and  $P = 0.028$ , respectively). Economic status was also a significant factor, indicating that participants with “very good and good” economic status were less likely to use ST and e-cigarettes ( $P = 0.036$  and  $0.012$ , respectively). Mother's education level significantly influenced the use of both ST and e-cigarettes, with participants with illiterate mothers showing a higher prevalence ( $P = 0.005$  and  $0.007$ , respectively). Peer influence played a substantial role, as participants who reported that their friends used tobacco were more likely to use both ST and e-cigarettes ( $P < 0.001$  for both). These findings underscore the intricate interplay of sociodemographic variables in shaping tobacco consumption patterns within the study population.

Table 5 displays the outcomes of logistic regression models investigating the associations between diverse predictor variables and the utilization of distinct tobacco products, including cigarettes, hookah, ST, and e-cigarettes (significant variables of Tables 3 and 4). In the cigarette model, age emerged as a significant predictor, indicating that older participants were more prone to smoking cigarettes (OR = 1.20,  $P < 0.001$ ). Furthermore, the education level of the mother played a significant role, with participants whose mothers had a secondary and high school education (OR = 2.19,  $P < 0.021$ ) or a university education (OR = 2.68,  $P < 0.026$ ) exhibiting a higher likelihood of smoking. The influence of friends using cigarettes (OR = 9.54,  $P < 0.001$ ) and employment status (OR = 2.52,  $P = 0.001$ ) was also significant. In the hookah model, the predictors included friends using hookah (OR = 31.05,  $P < 0.001$ ), marital status (OR = 2.10,  $P = 0.003$ ), and employment status (OR = 1.76,  $P = 0.010$ ). Similarly, participants with mothers who had a secondary and high school education (OR = 2.18,  $P = 0.009$ ) or a university education (OR = 3.57,  $P = 0.001$ ) were more inclined to smoke hookah. The ST model indicated that friends using ST (OR = 20.12,  $P < 0.001$ ) and employment status (OR = 3.37,  $P = 0.004$ ), with economic status exhibiting borderline significance ( $P = 0.012$ ), were significant predictors. Additionally, the mother's education level played a role, with participants having mothers educated up to secondary and high school (OR = 2.91,  $P = 0.034$ ) showing a higher likelihood of using ST. The e-cigarette model revealed that friends using cigarettes (OR = 7.91,  $P < 0.001$ ) and employment status (OR = 1.87,  $P < 0.028$ ) were significant predictors, with economic status showing borderline significance ( $P = 0.008$ ). These logistic regression models yield valuable insights into the

**Table 2.** Tobacco product use patterns among university students in Herat, Afghanistan

|                 | Cigarette |      | ST  |      | E-cigarette |      | Hookah       |     |      |
|-----------------|-----------|------|-----|------|-------------|------|--------------|-----|------|
|                 | n         | %    | n   | %    | n           | %    | n            | %   |      |
| Never           | 414       | 64.7 | 544 | 85.0 | 550         | 85.9 | Never        | 413 | 64.5 |
| Just tried      | 137       | 21.4 | 56  | 8.7  | 19          | 3.0  | Just tried   | 103 | 16.1 |
| Previously used | 17        | 2.7  | 10  | 1.6  | 10          | 1.6  | Some times   | 87  | 13.6 |
| Some time       | 47        | 7.3  | 6   | 0.9  | 56          | 8.7  | Once a month | 11  | 4.1  |
| Usually         | 25        | 3.9  | 24  | 3.8  | 5           | 0.8  | Once a week  | 26  | 1.7  |
| Total           | 640       | 100  | 640 | 100  | 640         | 100  | Total        | 640 | 100  |

factors influencing the use of various tobacco products among study participants, illuminating the intricate interplay of sociodemographic variables.

### Discussion

The results of this study reveal significant associations between sociodemographic variables and tobacco product use among university students in Herat, Afghanistan. Most participants in the sample were aged 21–25, residing in urban areas, and single. The prevalence of tobacco use, including cigarettes, hookah, ST, and e-cigarettes, varied among participants, with certain demographic factors showing notable associations.

Findings in this study on cigarette smoking align with international patterns, reflecting prevalence rates comparable to studies in neighboring countries. In this study, 35.3% of students reported having experienced cigarette smoking, but only 3.9% were regular smokers. This prevalence is notably higher than that observed in Iranian universities (19.8%),<sup>19</sup> as well as in other countries such as Turkey (18.5%),<sup>23</sup> Pakistan (24%),<sup>24</sup> and Saudi Arabia (14.5%).<sup>25</sup> Such disparities may be attributed to variations in tobacco control policies and enforcement across these regions, as well as differences in cultural attitudes towards smoking and societal norms regarding tobacco use.

The prevalence of regular hookah smoking was 1.7%, and 35.5% of participants reported having experienced hookah use. This rate is significantly lower than that reported in a previous study conducted at Herat University (88.1% experienced hookah use).<sup>22</sup> The disparity suggests the impact of bans imposed by the Taliban on hookah use in cafés.<sup>26</sup> This study's findings diverge from trends observed in studies conducted in Iran (51.1%),<sup>27</sup> the United States (40.5%),<sup>21</sup> and Poland (38%),<sup>28</sup> where hookah smoking tends to be more prevalent than cigarette smoking. Differences in public health campaigns, socioeconomic factors, and the availability of hookah lounges to students may also contribute to these international variations in hookah smoking prevalence among university students. This emphasizes the need for targeted interventions addressing both cigarette and hookah smoking among university students in Afghanistan.

The prevalence of ST use in this study was 15%,

surpassing rates reported in studies conducted in other countries. For instance, a study in Baluchestan, Iran, reported a prevalence of 23%,<sup>29</sup> while studies in South Africa and Pakistan documented rates of 3.1%,<sup>30</sup> and 3.1%,<sup>31</sup> respectively. Medical students exhibit a lower prevalence of ST consumption, likely attributed to their heightened awareness of the associated dangers, as confirmed by this study.

It is crucial to grasp the underlying risk factors contributing to smoking issues to comprehend tobacco smoking patterns among Afghan students, as suggested by various studies.<sup>32</sup> The argument posits that preventing youth from initiating smoking will decrease their likelihood of becoming smokers later in life.<sup>33</sup>

This study identifies several demographic factors associated with cigarette and hookah smoking, drawing on findings from reputable studies in the field. Marital status, employment status, and parental education levels emerge as significant predictors, aligning with previous research on smoking behavior.<sup>34–36</sup> Single individuals exhibit higher rates of both cigarette and hookah smoking, highlighting the impact of social factors on tobacco consumption.<sup>37,38</sup> Non-employed participants are more likely to use tobacco, suggesting a potential relationship between economic factors and smoking behavior, a trend observed in similar studies.<sup>39,40</sup> These factors underscore the multifaceted nature of tobacco consumption patterns, reflecting how societal and economic factors intertwine to shape smoking behaviors among university students.

Maternal education consistently emerges as a predictor, influencing both cigarette and hookah smoking, following the findings of other studies on university students.<sup>41</sup> The influence of friends' tobacco use is a significant factor for both cigarette and hookah consumption, highlighting the importance of peer dynamics in shaping smoking behavior, as documented in previous literature.<sup>34,42</sup> According to UNESCO, Afghanistan's male literacy rate is 52.06%, while the female literacy rate is 22.6%, highlighting a significant gender gap.<sup>43</sup> This suggests that mothers with low education may struggle to instill a strong aversion to tobacco use in their children. Additionally, these findings emphasize the interconnected roles of family and social influences, particularly parental education level, in shaping tobacco use among young adults.

**Table 3.** Association of sociodemographic variables with cigarette and hookah smoking among university students in Herat, Afghanistan

| Variables                 | Cigarette smoking |            |        | Hookah smoking |             |        |
|---------------------------|-------------------|------------|--------|----------------|-------------|--------|
|                           | Non-use, n (%)    | Use, n (%) | P      | Non-use, n (%) | Use, n (%)  | P      |
| <b>Age category</b>       |                   |            |        |                |             |        |
| 17–20                     | 146 (90.7)        | 15 (9.3)   | 0.173  | 134 (83.2)     | 27 (16.8)   | 0.619  |
| 21–25                     | 400 (88.7)        | 51 (11.3)  |        | 360 (79.8)     | 91 (20.2)   |        |
| 26+                       | 22 (78.6)         | 6 (21.4)   |        | 22 (78.6)      | 6 (21.4)    |        |
| <b>Marital status</b>     |                   |            |        |                |             |        |
| Single                    | 465 (90.1)        | 51 (9.9)   | 0.026  | 427 (82.8)     | 89 (17.2)   | 0.005  |
| Married                   | 103 (83.1)        | 21 (16.9)  |        | 89 (71.8)      | 35 (28.2)   |        |
| <b>Employment</b>         |                   |            |        |                |             |        |
| Yes                       | 173 (81.2)        | 40 (18.8)  | 0.000  | 156 (73.2)     | 57 (26.8)   | 0.001  |
| No                        | 395 (92.5)        | 32 (7.5)   |        | 360 (84.3)     | 67 (15.7)   |        |
| <b>Economic status</b>    |                   |            |        |                |             |        |
| Very good and good        | 106 (86.9)        | 16 (13.1)  | 0.370  | 95 (77.9)      | 27 (22.1)   | 0.206  |
| Average                   | 356 (90.1)        | 39 (9.9)   |        | 327 (82.8)     | 68 (17.2)   |        |
| Bad and very bad          | 106 (86.2)        | 17 (13.8)  |        | 94 (76.4)      | 29 (23.6)   |        |
| <b>Type of residence</b>  |                   |            |        |                |             |        |
| Urban                     | 261(86.4)         | 41(13.6)   | 0.078* | 241 (79.8)     | 61 (20.2)   | 0.618* |
| Rural                     | 307(90.8)         | 31(9.2)    |        | 275 (81.4)     | 63 (18.6)   |        |
| <b>Friends use</b>        |                   |            |        |                |             |        |
| No                        | 234 (97.9)        | 5 (2.1)    | 0.000  | 173 (98.9)     | 2 (1.1)     | 0.000  |
| Yes                       | 334 (83.3)        | 67 (16.7)  |        | 343 (73.8)     | 122 (26.2)  |        |
| <b>Accommodation</b>      |                   |            |        |                |             |        |
| With family               | 249(91.2)         | 24(8.8)    | 0.146  | 225 (82.4)     | 48 (17.6)   | 0.033  |
| Dormitory                 | 149(89.8)         | 17(10.2)   |        | 141 (84.9)     | 25 (15.1)   |        |
| Personal home             | 68(84.0)          | 13(16.0)   |        | 57 (70.4)      | 24 (29.6)   |        |
| Other                     | 102(85.0)         | 18(15.0)   |        | 93 (77.5)      | 27 (22.5)   |        |
| <b>Father's education</b> |                   |            |        |                |             |        |
| Illiterate                | 301 (92.0)        | 26 (8.0)   | 0.050  | 271 (82.9)     | 56 (17.1)   | 0.016  |
| Primary school            | 53 (82.8)         | 11 (17.2)  |        | 54 (84.4)      | 10 (15.6)   |        |
| Secondary and high        | 113 (85.6)        | 19 (14.4)  |        | 109 (82.6)     | 23 (17.4)   |        |
| University                | 101 (86.3)        | 16 (13.7)  |        | 82 (70.1)      | 35 (29.9)   |        |
| <b>Mother's education</b> |                   |            |        |                |             |        |
| Illiterate                | 430 (91.1)        | 42 (8.9)   | 0.001  | 397 (84.1)     | 75 (15.9)   | 0.000  |
| Primary school            | 44 (91.7)         | 4 (8.3)    |        | 39 (81.3)      | 9 (18.8)    |        |
| Secondary and high        | 63 (78.8)         | 17 (21.3)  |        | 57 (71.3)      | 23 (28.7)   |        |
| University                | 31 (77.5)         | 9 (22.5)   |        | 23 (57.5)      | 17 (42.5)   |        |
| <b>Father's job</b>       |                   |            |        |                |             |        |
| Yes                       | 457 (89.4)        | 54 (10.6)  | 0.277  | 410 (80.2)     | 101 (19.8)  | 0.619  |
| No                        | 111 (86.0)        | 18 (14.0)  |        | 106 (82.2)     | 23 (17.8)   |        |
| <b>Mother's job</b>       |                   |            |        |                |             |        |
| Yes                       | 51 (82.3)         | 11 (17.7)  | 0.089  | 41 (66.1)      | 21 (33.9)   | 0.002  |
| No                        | 517 (89.4)        | 61 (10.6)  |        | 475 (82.2)     | 103 (17.8)  |        |
| Total                     | 568 (100.0)       | 72 (100.0) |        | 516 (100.0)    | 124 (100.0) |        |

\*Fisher's exact test.

Building on insights from reputable sources, this study extends beyond traditional tobacco products to explore

ST and e-cigarette use patterns. Like cigarette and hookah smoking, non-employed individuals are more likely to

**Table 4.** Association of sociodemographic variables with ST and vaping among university students in Herat, Afghanistan

| Variables                 | ST consumption     |                   |        | E-cigarette smoking/vaping |                   |       |
|---------------------------|--------------------|-------------------|--------|----------------------------|-------------------|-------|
|                           | Non-use, n (%)     | Use, n (%)        | P      | Non-use, n (%)             | Use, n (%)        | P     |
| <b>Age category</b>       |                    |                   |        |                            |                   |       |
| 17–20                     | 153 (95.0)         | 8 (5.0)           | 0.948  | 142 (88.2)                 | 19 (11.8)         | 0.330 |
| 21–25                     | 430 (95.3)         | 21 (4.7)          |        | 410 (90.9)                 | 41 (9.1)          |       |
| 26+                       | 27 (96.4)          | 1 (3.6)           |        | 27 (96.4)                  | 1 (3.6)           |       |
| <b>Marital status</b>     |                    |                   |        |                            |                   |       |
| Single                    | 495 (95.9)         | 21 (4.1)          | 0.132  | 468 (90.7)                 | 48 (9.3)          | 0.687 |
| Married                   | 115 (92.7)         | 9 (7.3)           |        | 111 (89.5)                 | 13 (10.5)         |       |
| <b>Employment</b>         |                    |                   |        |                            |                   |       |
| Yes                       | 194 (91.1)         | 19 (8.9)          | 0.000  | 185 (86.9)                 | 28 (13.1)         | 0.028 |
| No                        | 416 (97.4)         | 11 (2.6)          |        | 394 (92.3)                 | 33 (7.7)          |       |
| <b>Economic status</b>    |                    |                   |        |                            |                   |       |
| Very good and good        | 114 (93.4)         | 8 (6.6)           | 0.036  | 106 (86.9)                 | 16 (13.1)         | 0.012 |
| Average                   | 383 (97.0)         | 12 (3.0)          |        | 368 (93.2)                 | 27 (6.8)          |       |
| Bad and very bad          | 113 (91.9)         | 10 (8.1)          |        | 105 (85.4)                 | 18 (14.6)         |       |
| <b>Type of residence</b>  |                    |                   |        |                            |                   |       |
| Urban                     | 283 (93.7)         | 19 (6.3)          | 0.070  | 267 (88.4)                 | 35 (11.6)         | 0.094 |
| Rural                     | 327 (96.7)         | 11 (3.3)          |        | 312 (92.3)                 | 26 (7.7)          |       |
| <b>Accommodation</b>      |                    |                   |        |                            |                   |       |
| With family               | 264 (96.7)         | 9 (3.3)           | 0.183  | 249 (91.2)                 | 24 (8.8)          | 0.465 |
| Dormitory                 | 159 (95.8)         | 7 (4.2)           |        | 149 (89.8)                 | 17 (10.2)         |       |
| Personal home             | 77 (95.1)          | 4 (4.9)           |        | 76 (93.8)                  | 5 (6.2)           |       |
| Other                     | 110 (91.7)         | 10 (8.3)          |        | 105 (87.5)                 | 15 (12.5)         |       |
| <b>Father's education</b> |                    |                   |        |                            |                   |       |
| Illiterate                | 317 (96.9)         | 10 (3.1)          | 0.189  | 301 (92.0)                 | 26 (8.0)          | 0.237 |
| Primary school            | 60 (93.8)          | 4 (6.3)           |        | 60 (93.8)                  | 4 (6.3)           |       |
| Secondary and high        | 125 (94.7)         | 7 (5.3)           |        | 116 (87.9)                 | 16 (12.1)         |       |
| University                | 108 (92.3)         | 9 (7.7)           |        | 102 (87.2)                 | 15 (12.8)         |       |
| <b>Mother's education</b> |                    |                   |        |                            |                   |       |
| Illiterate                | 456 (96.6)         | 16 (3.4)          | 0.005  | 431 (91.3)                 | 41 (8.7)          | 0.007 |
| Primary school            | 47 (97.9)          | 1 (2.1)           |        | 45 (93.8)                  | 3 (6.3)           |       |
| Secondary and high        | 72 (90.0)          | 8 (10.0)          |        | 73 (91.3)                  | 7 (8.8)           |       |
| University                | 35 (87.5)          | 5 (12.5)          |        | 30 (75.0)                  | 10 (25.0)         |       |
| <b>Father's job</b>       |                    |                   |        |                            |                   |       |
| Yes                       | 490 (95.9)         | 21 (4.1)          | 0.169  | 463 (90.6)                 | 48 (9.4)          | 0.813 |
| No                        | 120 (93.0)         | 9 (7.0)           |        | 116 (89.9)                 | 13 (10.1)         |       |
| <b>Mother's job</b>       |                    |                   |        |                            |                   |       |
| Yes                       | 62 (98.4)          | 1 (1.6)           | 0.228  | 53 (85.5)                  | 9 (14.5)          | 0.160 |
| No                        | 549 (95.0)         | 29 (5.0)          |        | 526 (91.0)                 | 52 (9.0)          |       |
| <b>Friend use</b>         |                    |                   |        |                            |                   |       |
| No                        | 354 (99.4)         | 2 (0.6)           | 0.000* | 234 (97.9)                 | 5 (2.1)           | 0.000 |
| Yes                       | 256 (90.1)         | 28 (9.9)          |        | 345 (86.0)                 | 56 (14.0)         |       |
| <b>Total</b>              | <b>610 (100.0)</b> | <b>30 (100.0)</b> |        | <b>579 (100.0)</b>         | <b>61 (100.0)</b> |       |

\*Fisher's exact test

use ST and e-cigarettes. Economic status also plays a role, with those of higher economic status exhibiting lower

prevalence rates of ST and e-cigarette use, aligning with previous research.<sup>44,45</sup>

**Table 5.** Logistic regression models of tobacco product use among university students in Herat, Afghanistan

| Variables                      | P value                   | OR    | 95% CI for OR |         |
|--------------------------------|---------------------------|-------|---------------|---------|
|                                |                           |       | Lower         | Upper   |
| <b>Cigarette<sup>1</sup></b>   |                           |       |               |         |
| Constant                       | 0.000                     | 0.000 |               |         |
| Age                            | 0.003                     | 1.200 | 1.064         | 1.354   |
| Mother's education             | Illiterate (Ref.)         | 0.028 |               |         |
|                                | Primary school            | 0.868 | 0.296         | 2.797   |
|                                | Secondary and high school | 0.021 | 1.127         | 4.277   |
|                                | University                | 0.026 | 1.127         | 6.389   |
| Friends' use                   | No (Ref.)                 |       |               |         |
|                                | Yes                       | 0.000 | 3.709         | 24.548  |
| Employment                     | No (Ref.)                 |       |               |         |
|                                | Yes                       | 0.001 | 1.482         | 4.273   |
| <b>Hookah<sup>2</sup></b>      |                           |       |               |         |
| Constant                       | 0.000                     | 0.006 |               |         |
| Friends' use                   | No (Ref.)                 |       |               |         |
|                                | Yes                       | 0.000 | 7.541         | 127.866 |
| Marital status                 | Single (Ref.)             |       |               |         |
|                                | Married                   | 0.003 | 1.279         | 3.458   |
| Employment                     | No (Ref.)                 |       |               |         |
|                                | Yes                       | 0.010 | 1.142         | 2.706   |
| Mother's education             | Illiterate (Ref.)         | 0.001 |               |         |
|                                | Primary school            | 0.657 | 0.530         | 2.735   |
|                                | Secondary and high school | 0.009 | 1.213         | 3.926   |
|                                | University                | 0.001 | 1.717         | 7.452   |
| <b>ST<sup>3</sup></b>          |                           |       |               |         |
| Constant                       | 0.000                     | 0.003 |               |         |
| Friends' use                   | No (Ref.)                 |       |               |         |
|                                | Yes                       | 0.000 | 4.659         | 86.871  |
| Employment                     | No (Ref.)                 |       |               |         |
|                                | Yes                       | 0.004 | 1.471         | 7.735   |
| Mother's education             | Illiterate (Ref.)         | 0.095 |               |         |
|                                | Primary school            | 0.662 | 0.077         | 5.116   |
|                                | Secondary and high school | 0.034 | 1.086         | 7.792   |
|                                | University                | 0.136 | 0.758         | 7.639   |
| Economic status                | Bad (Ref.)                | 0.012 |               |         |
|                                | Average                   | 0.190 | 0.193         | 1.386   |
|                                | Very good                 | 0.144 | 0.754         | 6.949   |
| <b>E-cigarette<sup>4</sup></b> |                           |       |               |         |
| Constant                       | 0.000                     | 0.021 |               |         |
| Friends' use                   | No (Ref.)                 |       |               |         |
|                                | Yes                       | 0.000 | 3.104         | 20.177  |
| Employment                     | No (Ref.)                 |       |               |         |
|                                | Yes                       | 0.028 | 1.068         | 3.262   |
| Economic status                | Bad (Ref.)                | 0.008 |               |         |
|                                | Average                   | 0.065 | 0.270         | 1.040   |
|                                | Very good                 | 0.340 | 0.676         | 3.107   |

<sup>1</sup>  $P < 0.05$  significance level, backward stepwise 3 steps, omnibus=0.000, Cox and Snell R-square=0.108, Nagelkerke R-square=0.213, Hosmer and Lemeshow test=0.033.

<sup>2</sup>  $P < 0.05$  significance level, backward stepwise 5 steps, omnibus=0.000, Cox and Snell R-square=0.150, Nagelkerke R-square=0.239, Hosmer and Lemeshow test=0.686.

<sup>3</sup>  $P < 0.05$  significance level, backward stepwise 2 steps, omnibus=0.000, Cox and Snell R-square=0.088, Nagelkerke R-square=0.281, Hosmer and Lemeshow test=0.516.

<sup>4</sup>  $P < 0.05$  significance level, backward stepwise 3 steps, omnibus=0.000, Cox and Snell R-square=0.066, Nagelkerke R-square=0.141, Hosmer and Lemeshow test=0.846.

Living arrangements, particularly residing in dormitories or single houses, emerge as strong risk factors for various high-risk behaviors, a pattern supported by existing literature on communal living settings.<sup>46</sup> This underscores the need for targeted interventions in these environments.

### Limitations

This study recognizes certain constraints, such as the reliance on self-report data and utilizing a cross-sectional design. Despite efforts to maintain confidentiality, it is important to note that under-reporting high-risk behaviors could be a potential limitation. Furthermore, the study's scope was limited to a single region and university. Additionally, it is crucial to highlight that the study did not include female participants, as their inclusion was hindered by the Taliban ban during the data collection period. Future research endeavors should delve into the various factors influencing smoking initiation and the development of effective prevention strategies, especially among Afghan university students.

### Conclusion

This study on university students in Herat, Afghanistan, reveals significant associations between sociodemographic variables and tobacco product use. While the prevalence of cigarette smoking aligns with international patterns, hookah smoking rates differ, potentially influenced by bans imposed on hookah use. The study identifies noteworthy disparities in ST use, surpassing rates reported in other countries, and emphasizes the importance of targeted interventions addressing both cigarette and hookah smoking among Afghan students. Demographic factors such as marital status, employment, parental education, and peer influence are significant predictors of smoking behavior, reinforcing the need for comprehensive preventive measures. The study extends beyond traditional tobacco products to explore patterns in ST and e-cigarette use, revealing economic and living arrangement factors as additional contributors to tobacco consumption. These findings underscore the importance of tailored interventions, particularly in communal living settings, to address the diverse patterns of tobacco use among university students in Afghanistan.

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### Competing Interests

The authors have no conflict of interest.

### Ethical Approval

The Human Ethics Committee, Bureau of Research and Development, Faculty of Medicine, Herat University, approved the study on January 20, 2022. All participants provided written informed consent before participating in the study. The confidentiality and privacy of the participants were protected throughout the study, following the Declaration of Helsinki and the ethical principles of research involving human subjects.

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