

Nicotine dependence and its associated factors, among students from Public Health Colleges in Sudanese Universities

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Abstract

Objective: This study assesses nicotine dependence and its related factors among students enrolled in Public Health Colleges at Sudanese Universities. **Subjects and Methods:** A cross-sectional study was conducted in Sudan at Sudanese Universities between March 2023 and September 2023. 1960 students were surveyed to identify tobacco users. Among them, 694 students who reported tobacco use were included in the study and answered additional questions. **Tools of data collection:** Data was collected by a modified questionnaire derived from the Fagerstrom Test for Nicotine Dependence (FTND). **Results:** The study found that 46.1% of respondents are under 23 years old, with an average age of 20.68 years. About 35.7% come from high-income families. Academic performance is strong, with 56.8% of students earning "Good" or "Very Good" grades; 35.4% of participants use tobacco, starting at an average age of 15.65 years. Support for government tobacco regulations is strong, with 41.1% slightly agreeing and 23.5% fully agreeing. Nicotine dependence levels vary, with 7.9% showing Low Dependence, 18.0% Low to Moderate Dependence, 47.4% Moderate Dependence, and 26.7% High Dependence. Differences in smoking perceptions and behaviors exist among different groups, while opinions on relatives' tobacco use are consistent. **Conclusion and recommendations:** Enhance tobacco education in universities to increase awareness of smoking risks and addiction. Enforce stricter regulations to limit youth access to tobacco products through higher taxes, advertising restrictions, and public health campaigns. Tailor cessation programs to address varying levels of nicotine dependence. Involve families and communities in anti-smoking initiatives to promote smoke-free environments. Conduct ongoing research on tobacco use trends among young adults and assess the effectiveness of policies and educational initiatives.

Keywords: Cigarette smoking, Nicotine dependence, Students, Tobacco use, and Public Health.

Introduction

Tobacco use continues to be a major public health challenge worldwide, particularly affecting young adults, including university students (Samet, 2013; WHO, 2024). Research highlights that the prevalence of tobacco consumption among this demographic is notably high (Albasheer et al., 2023; WHO, 2023a). Numerous studies have documented that a significant proportion of college students partake in smoking and other tobacco-related activities, which encompass e-cigarettes and smokeless tobacco products. Evidence suggests that tobacco use, and nicotine dependence are linked to numerous negative health consequences (Alotaibi et al., 2019). These include respiratory diseases and cardiovascular problems, furthermore, it also raises the likelihood of various cancers, contributing to over 8 million deaths each year globally (Australian Government, 2024; WHO, 2023b).

Smoking is recognized as the primary reason for early death globally. It significantly heightens

the risk for conditions such as cardiovascular disease, cancer, chronic lung disease, and diabetes, thereby increasing the likelihood of developing multiple illnesses and experiencing early death (CDC, 2024, WHO, 2023c). Approximately 8 million deaths are directly linked to tobacco use, while an additional 1.3 million deaths are related to liability to second-hand smoke (Food and Drug Administration, 2024; Laroussy et al., 2024).

Nicotine, the addictive substance found in tobacco, plays a significant role in the continued consumption of tobacco products (Shrestha et al., 2021). The impact of tobacco use is profound, resulting in millions of fatalities each year and carrying considerable economic consequences on a global scale (Otavova et al., 2020; Le Foll et al., 2022; WHO, 2020). Nicotine addiction is defined by a strong urge to smoke, even in the face of harmful health consequences (Schafferer et al., 2018; Ali, 2020; Parascandola, 2011). This dependence can exacerbate mental health issues such as anxiety, depression, and stress

levels (Dawood et al., 2016; Saunders, 2022). When individuals attempt to quit smoking, they often experience withdrawal symptoms that include anxiety, cravings, and irritability (Mannocci et al., 2014; Piña et al., 2018; NIDA, 2020). The issue of nicotine addiction is particularly concerning among students due to its potential effects on academic performance (Parmar et al., 2023). Studies have shown that smoking and nicotine use can negatively influence various dimensions of student achievement, including grade point average (GPA), attendance rates, and overall engagement in academic activities (West, 2017; Gould et al., 2020). Studies show that more than 75% of smokers want to quit smoking, and approximately one-third attempt to stop smoking each year. However, fewer than 10% manage to achieve long-term abstinence (Joseph et al., 2011).

According to World Bank reports, tobacco consumption in Sudan is notably higher among men (27.9%) than among women (0.8%). Among youth aged 13-15, the overall rate of tobacco use stands at 11.7% (Elgoni and Mohammed, 2022; World Bank, 2024).

Intervention programs targeting the reduction of tobacco use are urgently needed, which should include public awareness campaigns and cessation support initiatives. Despite progress made in lowering tobacco consumption rates, the health risks associated with tobacco use remain significant and pervasive (WHO, 2021; Mahajan et al., 2021; Siahpush et al., 2006; Alqahtani et al., 2023). The objective of this study was to assess nicotine dependence and its related factors among students enrolled in Public Health Colleges at Sudanese Universities.

Aim of the study

The aim is to quantify the nicotine dependence rate, analyze contributing factors, and formulate specific recommendations to guide future research and interventions to reduce the negative impacts of tobacco use.

Research questions:

1. What is the prevalence of nicotine dependence among students in Public Health Colleges at Sudanese universities, and how does it vary by age and socioeconomic status?

2. What psychosocial and environmental factors are linked to nicotine dependence among these students?

Methods:

Study design: A cross-sectional study was conducted in Sudan at Sudanese Universities between March 2023 and September 2023.

Setting: The study took place at Public Health Colleges in Sudanese Universities.

Study Population:

The study involved students from Public Health Colleges in Sudanese Universities, such as Khartoum University, Al-Zaem Al-Azhary University, Bahry University, University of Shendi, University of Kordofan, and El-Imam El-Mahdi University.

Sample Size Calculation:

A total of 1960 students took part in the study as total coverage, with varying sample sizes for each university: the University of Khartoum (382), Al-Zaem Al-Azhary University (350), Bahry University (355), University of Shendi (221), University of Kordofan (333), and El-Imam El-Mahdi University (319). Only 694 students who were current tobacco product users and met the selection criteria were included in the study.

Data Collection Methods:

Participants completed a revised questionnaire based on the Fagerstrom Test for Nicotine Dependence (FTND). The questionnaire included demographic variables such as age, family economic status, and academic grade performance. It also contained knowledge questions about nicotine addiction, health risks, and cessation methods, with responses in yes or no format. Attitudes were assessed through five questions about beliefs on smoking, social norms, and feelings about quitting, using a Likert scale from "slightly agree" to "slightly disagree." Practice questions from the FTND evaluated smoking behavior and dependence levels. Scores ranged from 0 to 10, with higher scores indicating greater dependence. Scores of 0-2 suggest low dependence, 3-4 low to moderate dependence, 5-7 moderate dependence, and 8 and higher high dependence.

Eligibility Criteria:

1. They must be enrolled as students in one of the six identified Public Health Colleges.
2. They must have reported tobacco use, as only those who are users would complete the Fagstrom Test for Nicotine Dependence (FTND).
3. Participation was voluntary; thus, only those who chose to submit their questionnaires were included.

Statistical Analysis:

The data analysis was conducted using SPSS version 22. Initially, descriptive statistics were used to summarize the demographic characteristics and tobacco use patterns among participants. This process included the calculation of frequencies, percentages, and different measures of central tendency (such as mean and median) as well as dispersion (range and standard deviation). For key variables such as age, gender, and smoking habits. Subsequently, inferential statistics were applied to explore the relationships between tobacco use behaviors and various influencing factors. Chi-square tests were employed to evaluate associations between categorical variables. Furthermore, performing logistic regression analysis to predict the degree of nicotine dependence using identified predictors. To examine mean differences in continuous variables related to nicotine dependence (measured by the KTSND), one-sample t-tests were conducted across different demographic groups, attitudes, and behaviors. Furthermore, one-way ANOVA was employed to analyze differences among multiple groups in their way of using tobacco. Statistical Analysis: A significance level of $p < 0.05$ was set for all statistical tests conducted. The results of the descriptive statistics and correlation coefficients were presented in tables and figures, with p-values indicating the significance of the findings.

Results:

Table 1: Shows the demographic characteristics of the participants in the study reveal a diverse age distribution, with 11.9% aged over 18 years, 41.9% between 18 and 21 years, and the majority (46.2%) under 23 years. In terms of family economic status, participants were evenly distributed across categories: 31.5% reported low

economic status, 32.8% middle, and 35.7% high. Regarding academic grade performance (AGP), the results indicated that 10.4% had poor performance (>1), while mid-range performance (1 to <2) was reported by 16.6%. A significant portion achieved good (2 to <3) and very good (3 to <3.5) grades, each accounting for 28.4%, while excellent performance (<3.5) was noted by 16.2%.

Table 2. Reveals that 35.4% of respondents use tobacco products, while 64.6% do not. The average age of starting tobacco use was around 13-15 years, with most starting after age 15 (37.8%), followed by ages 13-15 (29.5%) and before age 13 (32.7%). Withdrawal symptoms were reported by only 13.3% of respondents, with a mean score of 1.87, indicating mild effects. Motivations for tobacco use included relaxation (52.2%), masculinity (34.8%), family modeling (29.4%), and peer influence (27.5%). Two-thirds of respondents were aware of the harmful effects of tobacco. The social acceptability of smoking was perceived by 54.2%, while 45.8% disagreed. Only 42.8% had attempted to quit smoking, and 15.3% engaged in smoke-free activities regularly.

Table 3. Shows that a significant number of students acknowledge the influence of peer pressure on teen smoking habits (37.0% slightly agree, 24.9% fully agree). There is optimism about the impact of public health campaigns on changing perceptions about smoking (53.0% slightly agree). Support for government regulations on tobacco products is evident, with 41.1% slightly agreeing and 23.5% fully agreeing.

Concern for public health is reflected in attitudes towards smoking in public places, with 42.2% slightly agreeing and 21.2% fully agreeing that restrictions should be in place. Additionally, there is recognition of the importance of seeking help for nicotine addiction, with 42.8% slightly agreeing and 21.8% fully agreeing

Figure 1. The distribution of nicotine dependence distribution among the participants as follows: Low Dependence: 55 individuals (7.9%), Low to Moderate Dependence: 125 individuals (18.0%), Moderate Dependence: 329 individuals (47.4%), and High Dependence: 185 individuals (26.7%). The

majority of participants fall into the “moderate dependence” category, accounting for 47.4% of the total sample.

Table 4. Displays significant differences in responses among groups regarding perceptions and behaviors related to smoking, feelings of harm from smoking, reasons for starting smoking, acceptance of family members as smokers, and knowledge about passive smoking. The results showed high significant levels with a *p-value* of 0.001.

The data in Table 5. Shows significant differences in opinions on teenage tobacco use ($p=0.990$, $F(3, 690) = 0.039$), with little variation among different groups. There are notable differences in responses regarding smokers' avoidance of learning about smoking harms ($p=0.002$, $F(5, 690) = 5.049$). However, no significant differences are found in opinions on relatives' tobacco use ($p=0.523$, $F(3, 690) = 2.750$), marrying a smoker ($p=0.581$, $F(3, 690) = 0.654$), smoking leading to drug abuse ($p=0.869$, $F(3, 690) = 0.239$), or adult smokers driving others to smoke ($p=0.058$, $F(2, 690) = 2.511$).

Table (1): Displays the demographic characteristics of the participants (N=1960)

Variables		Frequency (Percent)	Mean	Median	Standard Deviation
Age	>18 Years	234 (11.9)	13.34	17.21	0.681
	18 >21	822 (41.9)			
	21 < 23	904 (46.2)			
Family economic status	Low	618 (31.5)	2.04	2.0	0.819
	Middle	642 (32.8)			
	High	700 (35.7)			
Academic Grade Performance (AGP)	>1 Poor	204 (10.4)	3.24	3.0	1.240
	1 > 2 Mid	326 (16.6)			
	2 >3 Good	557 (28.4)			
	3 >3.5 Very Good	557 (28.4)			
	3.5 < Excellent	316 (16.2)			

Table (2): Respondent's behavior regarding tobacco use (n=1960, n=694 used tobacco)

Variables		Frequency	Percent	Mean	Median	S. Deviation
Do you use tobacco products?	Yes	694	35.4	1.65	2.00	0.478
	No	1266	64.6			
	Total	1960	100.0			
Age of initiating tobacco	>13 Years	227	32.7	11.05	13.00	1.838
	13-15 Years	205	29.5			
	<15 Years	262	37.8			
	Total	694	100.0			
Face Withdrawal Symptoms	Yes	92	13.3	1.87	2.00	0.339
	No	602	86.7			
	Total	694	100.0			
Factors that motivate tobacco use	Relaxation	362	52.2	2.57	1.00	1.781
	Masculinity	33	4.8			
	Modeling	29	4.2			
	Family influence	79	11.4			
	Friends and peer influence	191	27.5			
	Total	694	100.0			
Tobacco harm effects	Yes	463	66.7	1.3329	1.0000	0.47157
	No	231	33.3			
	Total	694	100.0			
Social acceptability	Yes	376	54.2	1.46	1.00	0.499
	No	318	45.8			
	Total	694	100.0			
Attempt to quit	Yes	297	42.8	1.57	2.00	0.495
	No	397	57.2			
	Total	694	100.0			
Do you engage in smoke-free activities?	Yes	106	15.3	1.85	2.00	0.360
	No	588	84.7			
	Total	694	100			

Table (3): Respondents' attitudes towards various aspects of tobacco (n=694)

Variables	Responses	Frequency	Percent
Attitudes towards seeking help for nicotine addiction.	Slightly agree	297	42.8%
	Agree	151	21.8%
	Neutral	88	12.7%
	Disagree	86	12.4%
	slightly disagree	72	10.4%
Attitudes about smoking in public places?	Slightly agree	293	42.2%
	Agree	147	21.2%
	Neutral	99	14.3%
	Disagree	87	12.5%
	slightly disagree	68	9.8%
Attitudes on government regulations regarding tobacco products?	Slightly agree	285	41.1%
	Agree	163	23.5%
	Neutral	87	12.5%
	Disagree	83	12.0%
	slightly disagree	76	11.0%
Attitudes about redounding of public health campaigns in changing perceptions about smoking?	Slightly agree	368	53.0%
	Agree	202	29.1%
	Neutral	52	7.5%
	Disagree	41	5.9%
	slightly disagree	31	4.5%
Attitudes about peer pressure influence teen smoking habits.	Slightly agree	257	37.0%
	Agree	173	24.9%
	Neutral	31	4.5%
	Disagree	22	3.2%
	slightly disagree	211	30.4%

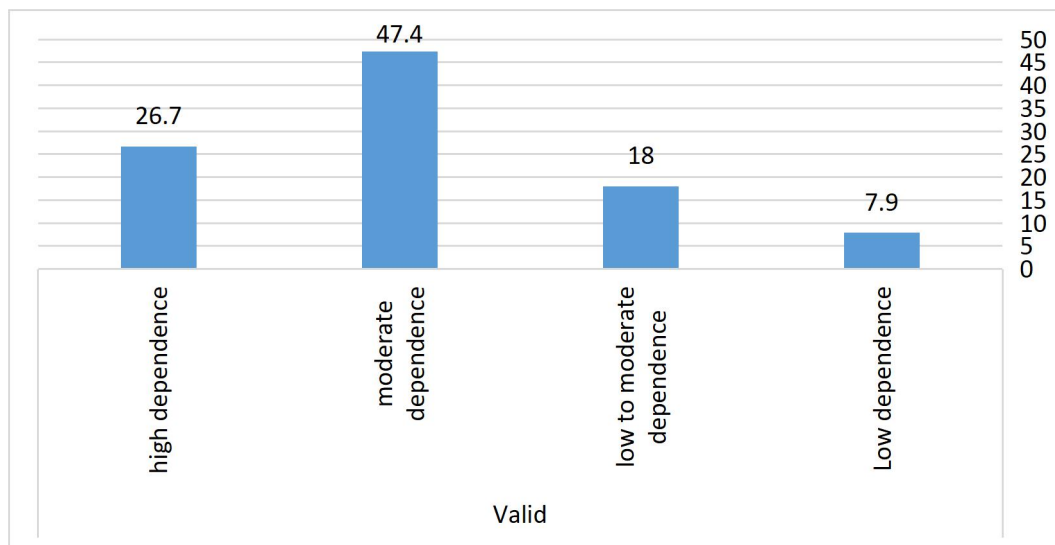


Figure (I): Nicotine Dependence Distribution among Participants (n=694)

Table (4): Shows the correlation between respondents' knowledge, perceptions, practices, and tobacco use (n=694)

ANOVA						
		Sum of Squares	df	Mean Square	F	P. value
Have you ever felt the negative effects of smoking?	Between Groups	574.994	1	574.994	14107.534	0.001
	Within Groups	79.804	1958	0.041		
	Total	654.798	1959			
Why do young people turn to smoking	Between Groups	5245.412	1	5245.412	4665.996	0.001
	Within Groups	2201.141	1958	1.124		
	Total	7446.553	1959			
At what age did you start smoking?	Between Groups	2686.612	1	2686.612	15958.332	0.001
	Within Groups	329.633	1958	0.168		
	Total	3016.244	1959			
Do you avoid learning about the risks of smoking?	Between Groups	1575.334	1	1575.334	40535.634	0.001
	Within Groups	76.094	1958	0.039		
	Total	1651.428	1959			
Agree for relatives to use tobacco	Between Groups	10.154	1	10.154	220.635	0.001
	Within Groups	90.113	1958	0.046		
	Total	100.267	1959			
Do you understand the concept of passive smoking?	Between Groups	6.005	1	6.005	40.936	0.001
	Within Groups	287.239	1958	0.147		
	Total	293.244	1959			
Has any family member expressed disapproval of smoking?	Between Groups	1498.792	1	1498.792	29764.512	0.001
	Within Groups	98.595	1958	0.050		
	Total	1597.387	1959			

Table (5): Correlation between dependence rate and respondents' attitudes regarding tobacco use (n=694)

ANOVA						
Variables		Sum of Squares	df	Mean Square	F	P. value
Opinions about teenage tobacco use	Between Groups	0.239	3	0.080	0.039	0.990
	Within Groups	1411.596	690	2.046		
	Total	1411.834	693			
Smokers usually avoid learning about the risks of smoking	Between Groups	17.375	3	5.792	5.049	0.002
	Within Groups	791.554	690	1.147		
	Total	808.929	693			
Opinions about relatives' use	Between Groups	4.145	3	1.382	0.750	0.523
	Within Groups	1271.759	690	1.843		
	Total	1275.903	693			
I agree to marry a smoker	Between Groups	3.592	3	1.197	0.654	0.581
	Within Groups	1262.894	690	1.830		
	Total	1266.486	693			
Smoking is the gateway to drug abuse	Between Groups	1.171	3	0.390	0.239	0.869
	Within Groups	1126.933	690	1.633		
	Total	1128.104	693			
Adult users drive others to smoke	Between Groups	8.692	3	2.897	2.511	0.058
	Within Groups	796.059	690	1.154		
	Total	804.751	693			

Discussions:

The study on nicotine dependence and its correlates among Public Health college students in Sudanese universities used a mixed-methods approach. The findings showed that most participants were under 23 years old, with 46.1% falling into this age group. A substantial number (41.9%) were between 18-21 years old, suggesting that many respondents are young adults who may be more likely to try nicotine products. A study published in the journal *Frontiers in Public Health* (Mahajan et al., 2021) highlighted that nicotine addiction often starts in adolescence, as the adolescent brain is particularly vulnerable to the neuro-inflammatory effects of nicotine. Only a small percentage (11.9%) were over 18 years old. The economic status of families varied, with 31.5% classified as low, 32.8% as middle, and 35.7% as high economic status. This distribution suggests that nicotine dependence may not be limited to any specific economic group but rather spans across different socioeconomic backgrounds (Siahpush et al., 2006) indicating that lower levels of education were associated with higher nicotine dependence. Academic performance was assessed based on cumulative GPA categories, revealing that 10.4% had poor academic performance (GPA < 1), while a substantial portion (28.4%) achieved good (GPA 2-3) and very good (GPA 3-3.5) grades. Notably, those with excellent GPAs (GPA < 3.5) constituted 16.1%, indicating a possible link between academic success and lower levels of nicotine dependence. This finding is consistent with (Alqahtani et al., 2023). The study found that 50% of respondents had a high to extremely high level of nicotine dependency. Smokers had lower GPAs, higher rates of absenteeism, and more warnings that were academic compared to nonsmokers.

The results in Table 2. Revealed that 35.4% (n=690) of respondents use tobacco products, while 64.6% (n=1260) do not. This aligns with the (WHO, 2020) stated that 22.3% of the world's population used tobacco, with higher rates among men than women. (Todorovic et al., 2022) found that 34.1% of students smoked, and (Cornelius et al., 2023) reported similar figures among adult populations in the US. Most respondents started using tobacco at the ages of 13-15 years (29.5%) and >15 years (37.8%), consistent with (CDC,

2022; Mahajan et al., 2021) findings that many tobacco users start at a young age. A notable portion (13.3%) experienced withdrawal symptoms when attempting to stop smoking, while the majority (86.7%) did not report such symptoms, indicating varying levels of dependence among users. Reasons cited for tobacco use included relaxation (52.2%), masculinity (34.8%), modeling (29.4%), family influence (11.4%), and friends and peer influence (27.5%). These findings are consistent with a previous study conducted by Bin Abdulrahman et al., (2022), they found that two-thirds (66.7%) of participants were aware of the harmful effects of tobacco, while one-third (33.3%) did not recognize these risks. This highlights the need for continued education on the risks of tobacco consumption. A significant portion (42.8%) had attempted to quit smoking at some point, reflecting broader trends in public health surveys where many smokers express a desire to quit but face challenges due to addiction and social factors. Only 15.3% engaged in smoke-free activities regularly, while the majority (84.7%) did not, suggesting potential barriers or lack of motivation to adopt healthier lifestyles.

The data in table 3. Shows that a significant number of respondents (37.0% slightly agree and 24.9% agree) believe that peer pressure plays a role in influencing teen smoking habits. This is consistent with existing literature, which consistently highlights the impact of peer influence on adolescent behavior, including smoking initiation and continuation. A study published in the journal *Tobacco Control* found that adolescents are more likely to initiate smoking if they perceive their peers as smokers or feel pressured by friends to smoke (Hossain et al., 2017). The minority of neutral (4.5%) and disagreement responses (3.2% disagree and 30.4% slightly disagree) suggest differing views on the significance of peer pressure, possibly reflecting individual differences in social environments or resistance to peer influence. The majority of respondents (53.0% slightly agree and 29.1% agree) believe that public health campaigns are effective in changing perceptions about smoking. This is supported by research indicating that well-designed campaigns result in significant reductions in smoking rates. For example, a study published in the journal *Frontiers in Public Health* found that adolescents

are more likely to initiate smoking if they perceive their peers as smokers or feel pressured by friends to smoke (Davis et al., 2019). Campaigns using graphic imagery and strong messaging have been shown to raise awareness about the dangers of smoking, leading to decreased initiation and increased cessation among smokers. Regarding government regulations, 41.1% slightly agree and 23.5% agree with the effectiveness of regulations on tobacco products. Studies have indicated that measures such as age restrictions, advertising bans, and taxation can reduce smoking prevalence among youth (Chaloupka, and Zeithamova, 2020). The neutral (12.5%) and disagreement responses (12.0% disagree and 11.0% slightly disagree) indicate some skepticism about the necessity or effectiveness of these regulations, possibly reflecting beliefs about personal choice versus government intervention.

Concerning respondent's attitudes towards smoking in public places, the study revealed predominantly negative attitudes, with 42.2% slightly agreeing and 21.2% agreeing that it should be restricted or banned. Studies have shown that smoke-free laws safeguard non-smokers from exposure to secondhand smoke and contribute to lower smoking rates by discouraging tobacco use in social settings (CDC, 2020; Gao et al., 2011). There is a strong inclination towards seeking help for nicotine addiction, with 42.8% slightly agreeing and 21.8% agreeing on its importance. This aligns with research indicating that access to cessation programs can significantly help individuals trying to quit smoking settings (Apollonio et al., 2021; Galanti, 2008) and the United States National Center for Chronic Disease Prevention and Health Promotion (Khader et al., 2008). The presence of neutral responses (12.7%) suggests some ambivalence about seeking help, possibly influenced by stigma or lack of awareness about available resources.

Figure 1. Illustrates the distribution of nicotine dependence among participants: Low Dependence: 55 individuals (7.9%), Low to Moderate Dependence: 125 individuals (18.0%), Moderate Dependence: 329 individuals (47.4%), and High Dependence: 185 individuals (26.7%). The majority of participants fall into the "moderate dependence" category, accounting for 47.4% of the total sample. This finding is higher

than the results of (Khader et al., 2008) where 19% had high nicotine dependence, 48% had moderate dependence, and 33% had minimal dependence. This suggests a significant percentage of smokers in this study exhibit a moderate level of nicotine addiction. The statistical analysis includes key metrics: Total Sample Size: 694, Mean Difference: 1.97795, t-test Results: t-value (tdf): 693, Significance Level (Sig. [2-tailed]): .0001. The results show a notable disparity in nicotine dependence levels among participants. The high rates of moderate and high dependence suggest interventions should target those heavily dependent on nicotine. Tailored treatment programs may be needed for the majority of respondents in the moderate to high categories to effectively address their addiction. Table 4: The results indicate significant associations between various factors related to tobacco use among respondents.

The study reveals a strong correlation with knowledge and practices related to tobacco use. Respondents who acknowledged the harmful effects had a greater understanding of tobacco-related health issues. Regarding reasons for starting smoking, perceptions of social influences or stressors played significant factors in initiating tobacco use among youth. Understanding these motivations can help tailor prevention programs effectively. The analysis of the age of tobacco initiation indicates that earlier exposure was linked to different levels of knowledge and attitudes toward tobacco use. Early intervention through educational campaigns could be crucial in preventing early initiation. For the avoidance of learning about smoking dangers, those avoiding information may have different practices or perceptions. Addressing this avoidance through engaging in educational strategies could enhance knowledge positively. This suggests that education and awareness play a significant role in shaping attitudes towards smoking within the family unit. Overall, the findings underscore the importance of promoting a smoke-free environment within families to prevent the normalization of smoking behavior. Understanding passive smoking was also crucial, with significant differences in knowledge across groups. Educational initiatives to increase awareness about secondhand smoke exposure could influence anti-smoking practices. Family disapproval significantly influences individuals'

attitudes and behaviors toward smoking. Those with disapproving family members were less inclined to smoke. The findings highlighted the impact of social norms and family influences on smoking choices. Overall, the analysis revealed a strong correlation between respondents' knowledge, perceptions, and practices regarding tobacco use, emphasizing the need for comprehensive educational programs to reduce tobacco consumption rates effectively.

Table 5: The data reveals significant differences in opinions on teenage tobacco use, with a p -value of 0.990 ($F(3, 690) = 0.039$). The in-between-groups sum of squares is 2.393, while within groups it is much larger at 1411.596. This indicates little variation in opinions among different groups regarding teenage tobacco use, as shown by the high within-group sum of squares relative to the between-group sum of squares. A statistically significant result is observed ($p = 0.002$; $F(5, 690) = 5.049$), indicating notable differences in responses across groups concerning smokers' tendencies to avoid learning about smoking's harms. The between-groups sum of squares is 17.375 compared to a significantly larger within-groups sum of squares at 791.554, suggesting varying levels of awareness and concern across different groups. Regarding opinions on relatives' tobacco use, no meaningful difference was observed ($p = 0.523$; $F(3, 690) = 2.750$). The between-groups sum of squares is relatively low at 4.145 compared to a higher within-groups sum of squares at 1271.759, indicating consensus among respondents on this issue. Similarly, no significant differences are observed in opinions regarding marrying a smoker ($p = 0.581$; $F(3, 690) = 0.654$). The between-groups sum of squares is 3.592 against a much larger within-groups sum of squares at 1262.894. This suggests that personal relationships with smokers do not significantly influence attitudes toward marriage with smokers. The findings also show no significant differences in perceptions about smoking leading to drug abuse ($p = 0.869$; $F(3, 690) = 0.239$). With a low sum of squares between groups (1.171) compared to a higher within-group sum (1126.933), respondents generally agree on this point without substantial divergence in beliefs. Lastly, regarding whether adult smokers drive others to smoke, no meaningful difference was observed ($p = 0.058$; $F(2, 690) = 2.511$). The sum of squares

between groups is slightly higher at 8.692, but still overshadowed by the within-group variance at 796.059, indicating weak consensus on this issue.

Conclusion

The study sheds light on the demographics, academic performance, and tobacco use habits of the participants. A significant portion of the sample consists of young adults under 23 years old, highlighting a crucial developmental phase. While academic performance is generally strong, the prevalence of tobacco use, especially among young individuals, raises concerns about future health consequences.

The study revealed higher dependence levels present challenges for quitting and increase health risks. Targeted interventions and educational programs are essential to address this issue.

The study recommended implementing comprehensive public health initiatives tailored to reduce nicotine dependency among Sudanese university students, incorporating education, community involvement, and policy advocacy. Further research is needed to understand the factors contributing to high dependence rates.

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