Original Article

Prevalence and Correlates of Behavioral Risk Factors of Non-Communicable Diseases Among Undergraduates in University of Nigeria: A Cross-Sectional Study

CN Onwasigwe, CR Onwasigwe[1], UB Anyaehie[2]

Departments of Community Medicine, [1]Haematology and [2]Physiology, College of Medicine, University of Nigeria, Ituku-Ozalla Campus, Enugu, Nigeria

ABSTRACT

Background: There is an increasing prevalence of behavioral risk factors of non-communicable diseases (NCDs) among the youths in low- and middle-income countries. These may later in life lead to chronic diseases with high morbidity, mortality, and undesirable economic impact. **Aim:** To assess and compare the prevalence of major behavioral risk factors of NCDs between medical and non-medical university students in Enugu, Nigeria. **Methods:** A questionnaire-based comparative cross-sectional study was carried out among 620 undergraduates of the University of Nigeria using the modified WHO STEPS questionnaire for chronic disease surveillance and the International Physical Activity Questionnaire (IPAQ). Data were analyzed with descriptive and inferential statistics at the significance level of $P < 0.05$. Logistic regression analysis was carried out to predict the behavioral risk factors of NCDs. **Results:** The mean age of all the students was 22.5 ± 2.9 years. A greater proportion were females (54.8%). Physical inactivity was the most common behavioral risk factor of NCDs and was more prevalent in the medical students (91.0%) compared to 87.4% in the non-medical students. Overall, 95.0% of all respondents had at least one behavioral risk factor. For the medical students, younger age (AOR = 1.80 CI = 1.00 – 3.22, $P = 0.049$) and parents' lower educational level (AOR = 3.49, CI = 1.29 – 9.40, $P = 0.014$) predicted the presence of risk factors. For the non-medical students, single marital status (AOR = 3.66, CI = 1.20 –11.19, $P = 0.022$), lower level of study (AOR =2.92, CI = 1.13– 7.57, $P = 0.027$) and parents' lower level of education (AOR =6.48, CI = 1.41 – 29.85, $P = 0.017$) predicted the risk factors of NCDs. **Conclusion:** Behavioral risk factors were highly prevalent in both groups. There is an urgent need to introduce evidence-based intervention to curb the situation.

KEYWORDS: *Behavioral risk factors, Enugu, Nigeria, non-communicable diseases, prevalence, university students*

INTRODUCTION

The prevalence of non-communicable diseases (NCDs) and their associated behavioral risk factors have been found to be increasing especially in the low- and middle-income countries (LMICs) of which Nigeria is one. These diseases cannot be transmitted from one person to another and are the result of a combination of genetic, physiological, environmental, and behavioral factors.[1] Their impact is devastating with high morbidity, mortality, economic loss, and impairment in the quality of life. Deaths resulting from NCDs now surpass all communicable disease deaths combined. NCDs impose serious threats to economic growth and development of the society or nations by

Address for correspondence: Prof. CN Onwasigwe, Department of Community Medicine, College of Medicine, University of Nigeria, Ituku-Ozalla Campus, Enugu, Nigeria. E-mail: chikanma60@gmail.com

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perpetrating poverty.[2-4] The four main types of NCDs that are of priority to the World Health Organization (WHO) are cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes.[5] Other important NCDs include injuries, hemoglobinopathies, and mental health disorders. More than three-quarters of global NCD deaths (31.4 million) occur in the LMICs.[6,7] The preponderance of these diseases in these settings may be associated with their chronic nature and the large financial burden required for their management and control where most patients pay for healthcare out of pocket.[8] NCDs have been described as one of the greatest threats to development in the 21st century.[6,9] By 2030, LMICs, especially in sub-Saharan Africa, are expected to have eight times more deaths due to NCDs than high-income countries.[4] The WHO has therefore recognized the increasing prevalence of risk factors of NCDs among the youths as a major public health problem.

The adolescent period (10 years–19 years) is very fundamental to the development of NCDs. Habits and behaviors that are formed during the youth are long-lasting and very difficult to change.[10] It has been noted that more than 80% of adult smokers begin smoking before the age of eighteen years and 90% of adolescents do so before leaving their teens.[5] Adolescents who are smokeless tobacco users are more likely than nonusers to become adult cigarette smokers.[5,7] Long duration of overweight and obesity is often a result of physical inactivity and poor diet which are also detrimental to health.[11,12] Nigeria and other LMICs are currently experiencing an economic and social transition with changes in diet and reduced physical activity.[11] This has led to the triple burden of challenges to reduce morbidity and premature mortality from infectious diseases, NCDs, and a weak health system.

It has been documented that the incidence of risky behaviors is increasing among young people in Nigeria, and this will eventually lead to NCDs in later life.[12] University students are at the stage of life where they experiment and look for new experiences. Evidence shows that many cases of NCDs are due to these preventable behaviors and that the occurrence of two or more of these risk factors (i.e. clustering together) in an individual has been associated with increased risk of developing NCDs.[7] It has also been established that prevention of these risk factors has positive effects on reducing NCDs' rates and all-cause mortality.[5] Although much is known about the individual four major behavioral risk factors and their determinants, less is known about the pattern and potential determinants of multiple behavioral risk factors particularly in the youths.

It has not been previously documented in Enugu about the differences in risky behaviors of medical and non-medical students. The study therefore hopes to fill that gap and add to existing information on the prevalence of risk factors for NCDs, and to determine any specific differences in these factors among medical and non-medical students in Enugu. Studies on the health behaviors of Nigerian tertiary students are scarce.[3,7] Attention has previously been placed on older adults with most of the studies focusing on one aspect of behavioral risk factors of NCDs. The present study was on multiple behavioral risk factors among the youths which is pertinent because targeting young people for NCD prevention initiatives may improve long-term outcomes and lead to reductions in rates of NCDs. The results of this research may advise appropriate interventions that can be adopted by University Health Services and aid policy development in Nigeria to reduce the incidence, morbidity, and mortality from NCDs. This study therefore evaluated and compared the prevalence and correlates of behavioral risk factors of NCDs among medical and non-medical students at the University of Nigeria Enugu and Ituku-Ozalla Campuses.

SUBJECTS AND METHODS

Study area

The study was carried out in Enugu, the capital of Enugu State which is situated in the South-East geo-political zone of Nigeria with an estimated population of 876,000 based on the 2006 Census.[13] University of Nigeria Enugu Campus (UNEC), the second largest campus of the university where this study was conducted, is in the heart of Enugu City. UNEC comprises 25 academic departments across five faculties which include: Faculty of Basic Medical Sciences, Faculty of Law, Faculty of Business Administration, Faculty of Health Sciences and Technology, and Faculty of Environmental Studies. The Faculties of Basic Clinical Sciences, Clinical Sciences, and Dentistry are located at Ituku-Ozalla Campus, situated on the outskirts of Enugu Metropolis. The medical students are 1,699 in number while the Law students that represented the non-medical segment had a population of 1,400 students. The study was conducted at the two campuses of the University of Nigeria: Enugu and Ituku-Ozalla Campuses.

Study design

The study was a questionnaire-based comparative cross-sectional study using a multistage sampling technique.

Study population

The study was conducted among medical and non-medical undergraduates of the University of Nigeria in Enugu and Ituku-Ozalla Campuses.

Inclusion criteria

The inclusion criteria were all consenting medical and non-medical undergraduates in the selected faculties and departments of the university. Medical and non-medical undergraduates who had spent at least one full academic year and undergraduates who had valid university identification cards were involved in the study.

Exclusion criteria

Undergraduates who were critically ill or absent on the day of data collection were not part of the study.

Sample size determination

The sample size was calculated using the formula for comparing two proportions.[14] A previous study in southwest Nigeria universities noted a prevalence rate of 81% for cigarette smoking among the students.[15] A sample size of 310 undergraduate students in each arm of the study groups (total =620) was therefore sufficient to detect a difference of 10% between the groups, with 80% power and at 5% significance level. The calculated sample size was proportionately allocated to each level of medical and non-medical students.

Sampling technique

The study adopted a multistage sampling technique.

Stage 1 – Faculties in Medicine (Basic Medical Sciences, Basic Clinical Sciences, and Clinical Sciences) were purposively selected as well as one faculty (Law) from the non-medical faculties in UNEC, using simple random sampling by balloting. This gave a total of 4 faculties (3 medical and 1 non-medical).

Stage 2 – Selection of one department from the selected non-medical faculties by simple random sampling using balloting.

Stage 3 – Proportionate selection of eligible listed students from the various levels in selected medical and non-medical departments by systematic sampling.

At each level of study, the first student was selected with a table of random numbers and the next students with the calculated sampling interval (population size/sample size).

Study instruments

Self-administered semi-structured questionnaire modified from WHO STEPS questionnaire for chronic disease surveillance was used in the quantitative study.[7] This instrument has already been validated for use in Nigeria by several studies.[7,15-17] The questionnaire was used to collect data on the socio-demographic characteristics of the study subjects and the four major behavioral risk factors of NCDs (tobacco use, alcohol use, physical inactivity, and unhealthy diet). Physical activity was measured with the modified International Physical Activity Questionnaire (IPAQ).[16] Multiple studies in Nigeria have reported on the validity and reliability of the instrument.

Data collection methods

The class representatives of each class supplied the class register from where the study participants were selected. Questionnaires were distributed and retrieved by four trained research assistants who were resident doctors in the Department of Community Medicine, University of Nigeria Teaching Hospital, Ituku-Ozalla. Paper flashcards were shown to the respondents to demonstrate a standard measure of fruits/vegetables and alcoholic drinks. The research assistants were supervised daily and filled questionnaires checked daily to ensure quality of data collection.

Definition of terms

Dependent (outcome) variables were the behavioral risk factors while the independent variables were the socio-demographic characteristics of the respondents.

Current cigarette smoking: This was defined as any respondent who had smoked a cigarette in the last 30 days preceding the study.[7]

Alcohol use: This was recorded as any male subject that reports an average daily alcohol consumption of more than two drinks, and a female respondent that reports an average daily alcohol consumption of more than one drink.[7,16,17]

Physical inactivity: Respondents who reported no physical activity in the form of a formal exercise regimen, or who mostly sat and watched television, played computer games, talked with friends, played cards or phones were classified as sedentary. Those who had less than 5 days of less than 60 minutes moderate-to-vigorous physical activity in the past 7 days preceding the survey were classified as being physically inactive. Physical activity includes walking to school, playing football, running, and jogging.[7,16,17]

Unhealthy diet: This was defined as the lack of daily intake of fruits and/or vegetables (raw or cooked) and/or the daily intake of high fat or high sugar meals—consuming pastries or soft drinks at least once daily. This was determined by the recall of vegetables/fruit consumption in the last 7 days. Respondents who had less than five servings of fruits and vegetables on any of the days in the last 7 days preceding the survey were classified as having poor diets.[7,10,11,18]

The prevalence of risk factors was reported singly and as a cluster, and clustering was defined as the presence of two or more risk factors in a respondent.[7]

Statistical analysis

IBM SPSS Statistics version 26 was used for data analysis. Data collected were analyzed using descriptive and inferential statistics (chi-square test, independent samples *t*-test, and Fisher's exact test where the cell values were less than five). Logistic regression analysis was used to predict the risk factors of NCDs. At the bivariate analysis level, any association with $P < 0.2$ was included in the logistic regression model for prediction of dependent variables, i.e. the behavioral risk factors of NCDs. Adjusted odds ratios (AOR) and 95% confidence intervals were reported. The significance level of all statistical tests was $P < 0.05$.

Ethical considerations

The World Medical Association Declaration of Helsinki regarding ethical conduct of research involving human subjects was followed. Institutional protocol approval was obtained from the Health Research Ethics Committee of the College of Medicine, University of Nigeria Teaching Hospital, Ituku-Ozalla (UNN/COMHREC/2023 / 07/002) dated May 12, 2023. Informed consent from each participant was obtained after adequate information and explanation were provided on the objectives of the study, the risks, and benefits. Participation of the study participants was voluntary while confidentiality and data security were adequately assured. All information obtained in this study was given code numbers, and no name or identifier was recorded.

RESULTS

A total of 620 undergraduate students at the University of Nigeria (310 medical students and 310 non-medical

Table 1: Socio-demographic variables of the respondents				
Variable	**Department**		χ^2 **test**	**P**
	Medicine (*n*=310) Freq. (%)	**Law (*n*=310) Freq. (%)**		
Age group (years):				
<20	33 (10.6)	51 (16.5)		
20–24	200 (64.6)	205 (66.1)	9.084[∂]	0.028*
25–29	67 (21.6)	50 (16.1)		
≥30	10 (3.2)	4 (1.3)		
Mean age±standard deviation	23.0±2.9	22.0±2.9	*t*=4.293	SE diff.=0.233
Gender:				
Male	144 (46.5)	136 (43.9)	0.417	0.519
Female	166 (53.5)	174 (56.1)		
Marital status:				
Single	305 (98.4)	300 (96.8)	1.708	0.191
Married	5 (1.6)	10 (3.2)		
Tribe:				
Igbo	282 (91.0)	277 (89.4)	2.136[∂]	0.545
Yoruba	3 (0.3)	4 (1.3)		
Hausa	1 (1.0)	4 (1.3)		
Others	24 (7.7)	25 (8.0)		
Religion:				
Christianity	307 (99.0)	296 (95.5)	0.012[γ]	0.006*
Others	3 (1.0)	14 (4.5)		
Mother's highest level of education				
No formal	7 (2.3)	7 (2.3)	4.976	0.290
Primary	22 (7.1)	13 (4.2)		
Secondary	35 (11.3)	47 (15.2)		
Tertiary	153 (49.4)	144 (45.5)		
Postgraduate	93 (30.0)	102 (32.9)		
Father's highest level of education				
No formal	4 (1.3)	8 (2.6)	4.275[∂]	0.370
Primary	28 (9.0)	17 (5.5)		
Secondary	50 (16.1)	54 (17.4)		
Tertiary	131 (42.3)	131 (42.3)		
Postgraduate	97 (31.3)	100 (32.3)		
Area of residence:				
On-campus	220 (71.0)	153 (49.4)	30.209	<0.0001*
Off-campus	90 (29.0)	157 (50.6)		

[∂]Likelihood ratio Chi-square. [γ]Fisher's exact test. *Statistically significant

Table 2: Prevalence of behavioral risk factors of NCDs among medical and non-medical students at the University of Nigeria

Behavioral risk factors of NCDs	Medical students (*n*=310) Freq. (%)	Non-medical students (*n*=310) Freq. (%)	χ^2	*P*
Tobacco use:				
Yes	3 (1.0)	23 (7.4)	Fisher's exact test	<0.0001*
No	307 (99.0)	287 (92.6)		
Alcohol consumption:				
Yes	99 (31.9)	111 (35.8)	1.037	0.309
No	211 (68.1)	199 (64.2)		
Unhealthy diets:				
Yes	64 (20.6)	88 (28.4)	5.020	0.025*
No	246 (79.4)	222 (71.6)		
Physical inactivity:				
Yes	282 (91.0)	271 (87.4)	2.025	0.155
No	28 (9.0)	39 (12.6)		
Overall behavioral risk factor				
Has risk factor	295 (4.8)	294 (5.2)	0.034	0.854
No risk factor	15 (95.2)	16 (94.8)		

*Statistically significant

Table 3: Age-specific prevalence of risk factors among the respondents

Behavioral risk factor	Medical students		Non-medical students	
	≤24 years *n*=233 Freq. (%)	>24 years *n*=77 Freq. (%)	≤24 years *n*=256 Freq. (%)	>24 years *n*=54 Freq. (%)
Tobacco use	**1 (0.4)**	2 (2.6)	20 (7.8)	3 (5.6)
	Fisher's exact test=0.154		Fisher's exact test=0.777	
Alcohol consumption	66 (28.3)	33 (42.9)	86 (33.6)	25 (46.3)
	χ^2=5.622, *P*=0.018		χ^2=3.130, *P*=0.077	
Unhealthy diet	53 (22.7)	11 (14.3)	75 (29.3)	13 (24.1)
	χ^2=2.529, *P*=0.112		χ^2=0.598, *P*=0.439	
Physical inactivity	218 (93.6)	64 (83.1)	223 (87.1)	48 (88.9)
	χ^2=7.685, *P*=0.006*		χ^2=0.128, *P*=0.720	
Presence of any risk factor	225 (96.0)	70 (90.9)	242 (94.5)	52 (96.3)
	χ^2=4.023, *P*=0.045*		Fisher's exact test=1.000	

*Statistically significant

Table 4: Gender-specific prevalence of risk factors among the respondents

Behavioral risk factor	Medical students		Non-medical students	
	Male *n*=144 Freq. (%)	Female *n*=166 Freq. (%)	Male *n*=136 Freq. (%)	Female *n*=174 Freq. (%)
Tobacco use	2 (1.4)	1 (0.6)	12 (8.8)	11 (6.3)
	Fisher's exact test=0.599		χ^2=0.696, *P*=0.404	
Alcohol consumption	63 (43.8)	36 (21.7)	57 (41.9)	54 (31.0)
	χ^2=17.268, *P*<0.0001*		χ^2=3.929, *P*=0.047*	
Unhealthy diet	27 (18.8)	37 (22.3)	48 (33.8)	42 (24.1)
	χ^2=0.590, *P*=0.443		χ^2=3.523, *P*=0.061	
Physical inactivity	127 (88.2)	155 (93.4)	114 (83.8)	157 (90.2)
	χ^2=2.517, *P*=0.113		χ^2=2.849, *P*=0.091	
Presence of any risk factor	138 (95.8)	157 (94.6)	128 (94.1)	166 (95.4)
	χ^2=0.264, *P*=0.608		χ^2=0.257, *P*=0.612	

*Statistically significant

students) were studied to evaluate and compare their prevalence and correlates of behavioral risk factors of NCDs. Table 1 shows that a greater proportion of the students, 200 (64.6%) for medical and 205 (66.1%) for non-medical, were aged between 20 and 24 years. There was no statistically significant difference in their

Table 5: Association between socio-demographic characteristics and behavioral risk factors of the respondents

Socio-demographic characteristic	Medical students (*n*=310)		Non-medical students (*n*=310)	
	Has risk factor Freq. (%)	No risk factor Freq. (%)	Has risk factor Freq. (%)	No risk factor Freq. (%)
Age group (years):				
≤24	225 (96.6)	8 (3.4)	242 (94.5)	14 (5.5)
>24	7 (9.1)	70 (90.9)	52 (96.3)	2 (3.7)
	χ^2=4.023, *P*=0.045*		Fisher's exact test=1.000	
Gender:				
Male	138 (95.8)	6 (4.2)	128 (94.1)	8 (5.9)
Female	157 (94.6)	9 (5.4)	8 (4.6)	8 (4.6)
	χ^2=0.264, *P*=0.608		χ^2=0.257, P=0.612	
Marital status:				
Single	283 (95.3)	14 (4.7)	256 (94.1)	16 (5.9)
Married	12 (92.3)	1 (7.7)	38 (100.0)	0 (0.0)
	Fisher's exact test=0.482		Fisher's exact test=0.235	
Tribe:				
Igbo	269 (95.4)	13 (4.6)	261 (94.2)	16 (5.8)
Others	26 (92.9)	2 (7.1)	33 (100.0)	0 (0.0)
	Fisher's exact test=0.634		Fisher's exact test=0.235	
Level of study:				
Lower	67 (94.4)	4 (5.6)	175 (93.1)	13 (6.9)
Higher	228 (95.4)	11 (4.6)	119 (97.5)	3 (2.5)
	Fisher's exact test=0.754		Fisher's exact test=0.114	
Religion:				
Christianity	292 (95.1)	15 (4.9)	280 (94.5)	16 (5.4)
Others	3 (100.0)	0 (0.0)	14 (100.0)	0 (0.0)
	Fisher's exact test=1.000		Fisher's exact test=1.000	
Mother's educational level				
Up to secondary	57 (89.1)	7 (10.9)	63 (94.0)	4 (6.0)
Tertiary	238 (96.7)	8 (3.3)	231 (95.1)	12 (4.9)
	χ^2=6.515, *P*=0.011*		Fisher's exact test=0.756	
Father's educational level:				
Up to secondary	76 (92.7)	6 (7.3)	75 (74.9)	4 (5.1)
Tertiary	219 (96.1)	9 (3.9)	219 (94.8)	12 (5.2)
	χ^2=1.487, *P*=0.223		Fisher's exact test=1.000	
Place of residence:				
On-campus	209 (95.0)	11 (5.0)	143 (93.5)	10 (6.5)
Off-campus	86 (95.6)	4 (4.4)	151 (96.2)	6 (3.8)
	Fisher's exact test=1.000		χ^2=1.166, *P*=0.280	

*Statistically significant

mean age. Females constituted a greater majority in the two groups 166 (53.5%) and 174 (56.1%) for medical and non-medical students, respectively. Most of the respondents were single and practiced the Christian religion. There was a statistically significant difference in the religion of the respondents with more of the medical students being Christians 307 (99.0%), *P* = 0.006.

The majority of the students' mothers had tertiary education 153 (49.4%) for medical and 144 (45.5%) for non-medical students. A greater proportion of the fathers also had tertiary education 131 (42.3%) in both groups. Most of the medical students lived on-campus 220 (71.0%) compared to the non-medical students

153 (49.4%), and the difference was statistically significant (*P* < 0.0001).

Table 2 shows that a greater proportion of the non-medical students 23 (7.4%) used tobacco products compared to the medical students 3 (1.0%), and the difference was statistically significant (*P* < 0.0001). Consumption of unhealthy foods was more common among the non-medical students 88 (28.4%) compared to their medical counterparts 64 (20.6%), and the difference was also statistically significant (*P* = 0.025).

Figure 1 revealed that 95% of all respondents had at least one behavioral risk factor of NCDs. Only 9.3% of all the respondents had up to 3 risk factors. Figure 1
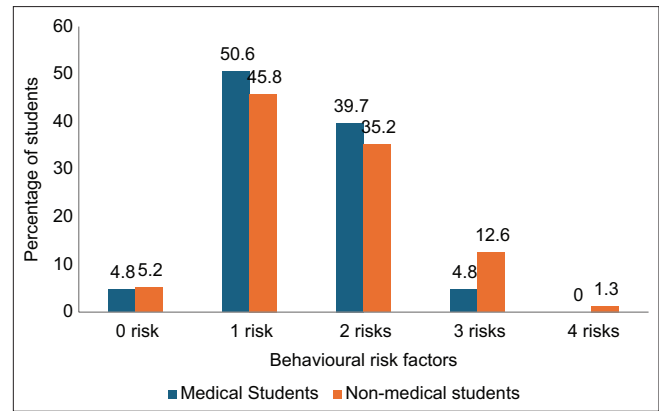
Table 6: Significant predictions of behavioral risk factors of NCDs among the respondents

Variables	AOR	95% Confidence Intervals		P
		Lower	Upper	
Medical Students				
Alcohol consumption:				
Age group:				
≤24	1.80	1.00	3.22	0.049*
>24	1			
Unhealthy diet:				
Mother's educational level				
Up to secondary school	3.50	1.30	9.40	0.014*
Tertiary	1			
Physical inactivity:				
Age group:				
≤24	0.36	0.15	0.88	0.026*
>24	1			
Non-medical Students				
Tobacco use:				
Marital status:				
Single	3.66	1.20	11.19	0.022*
Not single	1			
Level of study:				
Junior	2.92	1.13	7.57	0.027*
Senior	1			
Mother's educational level				
Up to secondary school	0.13	0.04	0.47	0.002*
Tertiary	1			
Father's educational level:				
Up to secondary school	6.48	1.41	29.85	0.017*
Tertiary	1			
Alcohol consumption:				
Level of study:				
Junior	2.20	1.29	3.75	0.004*
Senior	1			
Unhealthy diet:				
Level of study:				
Junior	0.48	0.26	0.88	0.017*
Senior	1			

*Statistically significant. AOR=Adjusted odds ratio

Figure 1: Clustering of multiple behavioral risk factors of NCDs

and indulged in unhealthy diets compared to the medical students. There was a significant association between age and physical inactivity among the medical undergraduates with more inactivity 218 (93.6%) noted in the younger students compared to the older ones 64 (83.1%). The presence of any behavioral risk factor of NCDs was significantly associated with age ($P = 0.045$) among the medical students, with the younger age group having a higher proportion of risk 225 (96.0%) compared to the older age group 70 (90.9%).

Table 4 shows that gender was significantly ($P < 0.0001$) associated with alcohol consumption among the medical students with a higher proportion of male students 63 (43.8%) indulging in the habit compared to the female students 36 (21.7%). Similarly, there was a significant relationship ($P = 0.047$) between gender and alcohol consumption among the non-medical undergraduates with a greater proportion of male students 57 (41.9%) indulging in the habit compared to the female students 54 (31.0%).

Table 5 revealed that age and mother's highest educational level were significantly associated with the presence of any behavioral risk factor of NCDs, $P = 0.045$ and $P = 0.011$, respectively, among the medical undergraduates. A higher proportion of the younger medical students 225 (96.6%) and those whose mothers attained tertiary education 238 (96.7%) had at least one risk factor. Conversely, there was no significant association between the socio-demographic characteristics of the non-medical students with the presence of any risky behaviors.

Table 6 revealed that significant predictors of alcohol consumption among the medical students was a younger age group (AOR = 1.80, CI = 1.00 − 3.22, $P = 0.049$). A significant predictor of unhealthy diet was mothers who had up to secondary school education (AOR = 3.49, CI = 1.30 − 9.40, $P = 0.014$). However, the younger age group was 2.75 times less likely (AOR = 0.36, CI

shows the clustering of the modifiable behavioral risk factors among the medical and non-medical students. About 50.6% and 39.7% of the medical undergraduates had 2 and 3 risk factors, respectively, while 45.8% and 35.2% of their non-medical counterparts had 2 and 3 risk factors, respectively. No medical student had 4 risk factors. There was a statistically significant difference in the distribution of risk factors among the two groups (Likelihood ratio $\chi^2 = 18.225$, $P = 0.001$).

Only one medical student (0.4%) in the younger age group compared to 2 (2.6%) in the older age group smoked cigarettes [Table 3]. A higher proportion of the non-medical students of all ages consumed alcohol

= 0.15 – 0.88, *P* = 0.026) to predict physical inactivity (*P* = 0.026).

Tobacco use among the non-medical students could be significantly predicted by the single marital status (AOR = 3.66, CI = 1.20 – 11.19, *P* = 0.022), junior level of study (AOR =2.92, CI = 1.13 – 7.57, *P* = 0.027), and father's educational level of up to secondary school (AOR = 6.48, CI = 1.41 – 29.85, *P* = 0.017). However, students whose mothers had up to the secondary level of education were 7.69 times less likely (AOR = 0.13, CI = 0.04 – 0.47, *P* = 0.002) to be current cigarette smokers.

DISCUSSION

The study was carried out to determine and compare the prevalence and correlates of behavioral risk factors of NCDs among medical and non-medical students at the University of Nigeria in Enugu and Ituku-Ozalla Campuses. The four major modifiable risky behaviors were assessed, namely tobacco use, alcohol consumption, unhealthy diets, and physical inactivity. Physical inactivity was the most prevalent behavioral risk factor in both the medical and non-medical students. This is in contrast with the findings of many researchers who recorded inadequate intake of fruits and vegetables as the commonest modifiable risk factor of NCDs.[17-19] Medical students recorded a higher rate of physical inactivity probably due to the many hours they sat down to study the large number of topics in their curriculum.

Prevalence of alcohol consumption, while the second commonest risky behavior in this study, was found to be more among the non-medical undergraduates (35.8%) compared to their medical counterparts (31.9%) although the difference was not statistically significant. Among both groups, the older and male students were more involved with the preventable habit. This agrees with the findings of other researchers in Nigeria and globally who attributed this to the better social acceptability of this practice among the males, and the less likelihood of females to binge alcohol in public.[7,15,16]

Unhealthy diets in the form of inadequate consumption of fruits and vegetables were found to be significantly commoner among the non-medical students compared to their medical counterparts. Higher rates of these were noted in other studies in Nigeria and Bangladesh.[17,19,20] Most university students have been noted by previous researchers to have poor eating habits with frequent snacking, consumption of fried foods, and low intake of daily fruits and vegetables.[7,21] For the first time in their lives, these young adults are out of the direct supervision of their parents and are responsible for what they eat and their lifestyle.[18,22,23] They drink sweetened soft drinks

containing more sugar than their daily requirements and drink alcohol as part of their diet. The university students are generally not much concerned about what they eat or drink. This is a dangerous practice that may lead to increased body weight and obesity which are recognized risk factors for numerous NCDs.[21]

A significantly greater proportion of the non-medical students used tobacco products (7.4%) compared to the medical students (1.0%). The prevalence of tobacco smoking among the medical students was lower than what was noted among public and private university students in Ibadan.[7,16] However, the prevalence among non-medical undergraduates was similar to the findings from Ibadan, but lower than what was observed in other developing nations like Pakistan.[24] Medical students did not indulge much in tobacco use because their study and practical experience must have made them to be more conversant with the untoward effects of such practices. Tobacco smoking was found to be more rampant among the older medical students, unlike the non-medical students who indulged more in the habit at a younger age. More males were involved with the habit compared to the females in both groups. This corroborates the findings from previous authors who attributed this to higher social and cultural acceptability of tobacco smoking in the males.[7]

It is well established by previous research that co-existence of two or more behavioral risk factors of NCDs is associated with an increased risk of developing these chronic diseases.[25] This study discovered that the majority (95%) of the study participants had at least one risk factor. Surprisingly, a significantly greater proportion of the medical students had a clustering of two or three risk factors compared to their non-medical counterparts. It would have been expected that due to the nature of their study, the medical students would not experience multiple risk factors.

In the bivariate analysis of the presence of any risk factor and socio-demographic characteristics, the younger age group of medical students and higher educational attainment of their mothers were significantly associated with a higher prevalence of risk factors. It would be deduced that the younger aged medical students are in the lower levels of study. At that stage, they would not have been well exposed to the clinical activities that are associated with their training, and so would not have been familiar with the deleterious effects of the risky lifestyle that would eventually manifest into NCDs. They would then be more likely to be involved with the risky behaviors. The mothers with higher levels of education are more likely to be better employed and capable to indulge their children with risky behaviors, especially alcohol consumption and unhealthy high-calorific foods.

This is unlike what was found in a southwestern Nigeria study where females were more likely to have behavioral risk factors of NCDs.[7]

Significant predictor of alcohol consumption among medical undergraduates was a younger age while unhealthy diet was the mother's educational level of secondary school and below. It has been noted globally that age of onset of alcohol use has dropped significantly.[5,7,9] Younger students and newer university entrants who are in transition from adolescence to adulthood experience a new freedom from parental and teacher supervision. This makes them to indulge in alcohol consumption and other risky behaviors that may later lead to NCDs.[15,17] Physical inactivity was significantly less likely in the younger aged medical students. This may be because these students have more time to indulge in sporting activities more than their older colleagues who are in higher classes with more serious academic and clinical work. For the non-medical students, tobacco use was significantly predicted by a single marital status, junior level of education, and father's educational level of secondary school and below. These findings agree with what previous researchers have noted in the western part of Nigeria and in other places.[7,17,24,25] Those with mother's educational level of secondary school and below were less likely to indulge in tobacco use. These mothers are likely to be in the lower socio-economic level and therefore financially incapable of supporting the risky behaviors of their offspring. Alcohol consumption was significantly predicted by the junior level of education which is similar to what was noted among the medical students. Unhealthy diet was significantly less likely in non-medical students of junior level of education. The senior non-medical students do not often have the time to cook more healthy foods for themselves and so will rely on food hawkers who supply unhealthy high calorific diet.

One of the limitations of the study was recall bias resulting from events that have happened some time ago. In addition to that, risk factors were not objectively validated because the respondents self-reported them. They might have given answers that were more favorable and socially desirable.

Conclusion

Behavioral risk factors of NCDs were prevalent among the medical and non-medical students at the University of Nigeria. More non-medical students had all four major risk factors combined. A greater proportion of the non-medical students used tobacco products and consumed unhealthy foods.

Recommendations

There is a need for continued surveillance of behavioral risk factors of NCDs among university students to provide evidence-based interventions. University medical centers should implement programs to encourage healthy lifestyles among students such as ban on sale of tobacco products and alcohol consumption within the campuses. Recreational activities and consumption of healthy diets including fruits and vegetables should be encouraged.

Conflicts of interest

There are no conflicts of interest.

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