ORIGINAL ARTICLE

Behavioural risk factors for non-communicable diseases among undergraduates in South-west Nigeria: knowledge, prevalence and correlates: a comparative cross-sectional study

OLUWATOMI FUNBI OWOPETU[1], AYODEJI MATTHEW ADEBAYO[2], OLUWAFEMI AKINYELE POPOOLA[2]
[1] Department of Community Medicine, University College Hospital, Ibadan, Nigeria; [2] Department of Community Medicine, College of Medicine, University of Ibadan, Ibadan, Nigeria

Keywords

Non-communicable diseases • Behavioural risk factors • Undergraduates • Nigeria

Summary

Low- and middle-income countries are experiencing a transition from a preponderance of infectious to Non-Communicable Diseases (NCDs). Many of the behaviours that produce these risks often commence in late adolescence. The study assessed the prevalence and knowledge of the major risk factors for NCDs among undergraduates in Ibadan Metropolis. This was a comparative cross-sectional study using a systematic random sampling technique. Data were collected using the WHO STEPs questionnaire and were entered and analysed using SPSS version 21. Data were analyzed with descriptive statistics, Chi-square test, and logistic regression at p < 0.05. Of 1,200 undergraduates, 646 (53.8%) were male and 1062 (88.5%) were aged 15-24 years; mean age was 20.4 (+/-3.5) years; 673 (56.1%) lived on campus. Only 3.1% of the respondents were current tobacco smokers. Also, 51.3% of respondents currently take alcohol with 11.2% classified as having excess alcohol use (> 6 standard drinks in one sitting in the last 30 days). About three quarters (70.6%) of respondents were classified as having unhealthy diets based on fruit/vegetable servings per day. Only 29.3% had adequate physical activity. Moreover, 48.3% were classified as having poor knowledge of the risk factors for NCDs. Overall, 99.3% of respondents had at least one behavioural risk factor. Public university undergraduates were more likely to have good knowledge of these risk factors OR 1.485 (95% CI: 1.485-2.398, p < 0.001). Behavioural risk factors for NCDs were prevalent among these undergraduates. Knowledge of NCD risk factors was average and those who attended public universities were more likely to have good knowledge of the risk factors for NCDs.

Introduction

Non-communicable diseases (NCDs) remain an important group of disease conditions [1, 2] – medical conditions that are mostly non-infectious and non-transmissible that increasingly contribute to the overall morbidity and mortality in humans worldwide [3-5]. NCDs are characterized by complex aetiology, multiple risk factors, and a long latency period [6]. They usually have a prolonged course of illness that may result in functional impairment and disability [7]. The major NCDs which are of priority to the World Health Organization (WHO) are cardiovascular diseases, diabetes, cancers, and respiratory diseases because of their public health significance [3]. In 2012, NCDs contributed to more than 60% of deaths globally [1]. The majority (82%) of these deaths, were among those younger than 70 years, with most (75%) occurring in low- and middle-income countries (LMICs) [2, 3]; a significant increase from 66% reported in 2005/2006 [4]. Consequently, the disproportionate rise in NCDs among LMICs worsens the developmental challenges associated with a double burden of communicable and non-communicable diseases [3, 5]. Furthermore, there are predictions that by the year 2020, NCDs will cause 70% of deaths in LMICs [5].

Although NCDs are mostly prevalent in middle to late adulthood, most behavioural and dietary risks are initiated during adolescence and young adulthood (15-24 years) [8]. NCDs are a result of a combination of modifiable and non-modifiable risk factors [8]. The WHO has targeted four major modifiable risk factors for NCDs: poor diet, physical inactivity, tobacco use, and harmful alcohol use [8]. These factors have also been identified by the Lancet NCD Action group and the NCD Alliance as priority intervention areas [9] and the modifiable risk factors can lead to metabolic/physiologic changes. The most common metabolic changes include increased blood pressure, elevated cholesterol levels, elevated glucose levels, and obesity [7, 10]. These risk factors for NCDs can occur in isolation or co-exist in an individual, however, the co-existence of two or more risk factors in an individual further increases the risk for NCDs [11]. The incidence of the above-mentioned risk behaviours is increasing among young people globally [8, 9]. About 40% of adolescents and young persons' use alcohol and about 50% of this continue to do so into adulthood [8, 9].

The increasing participation of young people in risk behaviours and their importance to the economic development of nations around the globe makes them critical to all efforts directed at the prevention and control of NCDs

https://doi.org/10.15167/2421-4248/jpmh2020.61.4.1523

worldwide. However, perhaps due, to the low prevalence of these diseases among young people as compared to older populations, the former seems to be ignored in the discussions of NCDs. The major focus of government interventions in developing countries among young persons is on communicable diseases; rightly so, but to curb and reduce the burden of NCDs, it is important to consider behavioural modification interventions among adolescents and young people. Focusing attention on risk behaviours among young people is conceivably a smart investment to address the preventive morbidity and mortality associated with NCDs.

While studies exploring risk factors of NCDs are available [10-11, 13-18] especially in Nigeria [10, 14, 15] most of these studies have focused on adults [16] or adolescents [11]. Very few, have been conducted among university undergraduates [15-17] and even fewer comparing public and private universities in Nigeria [18]. Most of these studies cited here also assessed the risk factors either in isolation or in pairs. However, this study explores the four main behavioural risk factors simultaneously among undergraduates in Nigeria. This is so, as the university environment offers the opportunity to provide a package of targeted interventions to the students in either public or private universities for the 4-6 years spent learning. Also, this phase of life offers opportunities for the adoption of both protective and adverse risk behaviours. This study intends to fill some gaps in research, regarding the knowledge and occurrence of the major risk factors, and potential translation of this evidence to inform appropriate interventions that can be adopted by University Health Services and aid policy development in Nigeria.

Methods

Study area

The study was conducted in Ibadan, Oyo State. Ibadan is the capital of Oyo State which is situated in the south-western geo-political zone of Nigeria. Ibadan is currently home to an estimated population of 3.6 million people, as projected from the 2006 census which had an estimated 2.5 million people, according to the National Population Commission [19]. Regarding educational institutions in Ibadan, there are 1,576 public primary schools and 324 secondary schools [20]. Also, there are three other higher institutions in Ibadan: School of Nursing and Midwifery and the College of Hygiene and Health Technology [20]. Furthermore, there is an estimated 1,252,424 youth (15-24 years) in the town [20].

Two universities with full-time academic programs, operating for more than 5 years in Ibadan were selected for the study. The study was conducted in one public and one private university. The choice of the institutions strategically reflects diversity in terms of both institutional types, ownership, and student characteristics, thereby ensuring representativeness.

The University of Ibadan is the first in Nigeria, founded in 1948, and is a major centre for undergraduate and postgraduate education in Nigeria [21] The population is drawn from a heterogeneous pool of students who come from all over the country and from some neighbouring countries to access education [21] Lead City University was founded in 2005 and also provides undergraduate and postgraduate education [22] to students from all around Nigeria and some neighbouring countries.

Study design

This study was a comparative cross-sectional study that utilized a quantitative data collection method.

Study population

The study was conducted among undergraduates at a public and private university.

Inclusion criteria

- All consenting undergraduates in the public and private university.
- Undergraduates who had spent at least one full academic session on full-time programs in both universities.
- Undergraduates who were in the selected departments and faculties.
- Students who had valid university identification cards.

Exclusion criteria

- Undergraduates who were critically ill were excluded from the study.

Sample size determination

The sample size was determined using the formula for comparing two proportions [23]. Using prevalence (P1) of alcohol use among undergraduate of 72% from a previous study [11], assuming a 10% difference and adjusting for 10% non-response, the minimum sample size calculated was 571 in each group, giving a total of 1,142 respondents.

Sampling technique

This study adopted a systematic random sampling technique.

- Stage 1 - Selection of faculties: a list of all faculties in both schools was obtained and stratified into three categories: Science-related, Education, and Art-related faculties [17]. 1 faculty from each of these three was then chosen.
- Stage 2 - Selection of Departments: three departments were randomly selected from selected faculties by balloting. Proportional allocation was used to determine the number of respondents that were to be chosen in each of the selected departments.
- Stage 3 - Selection of students: within each of the selected departments, a sampling fraction was determined after which the first respondent was selected using a table of random numbers.

The first student was pre-selected from the list using a systematic sampling approach; using a table of random

numbers. The next students were selected as the nth number from the first. In situations when a pre-selected student was not available, the next nth student was picked**.** To get the sampling fraction, = n/N (sample size/ total number of students) was used.

Study instrument

Data was collected using interviewer assisted semi-structured questionnaire. The questionnaire was adapted from the WHO STEPS Questionnaire for chronic disease surveillance and was already validated for use in Lagos, Nigeria [24].

Data collection methods

At each level, the class representatives were approached for a class list in 2018. Training of 8 research assistants (with minimum BSc qualification) was conducted over 2 days. Research assistants (RA) were trained on the content and method of administration of the questionnaire as well as maintenance of ethical standards of confidentiality, beneficence, non-maleficence by the principal investigator. Paper flashcards were used in the training of RA to demonstrate a standard measure of fruits/ vegetables and alcoholic drinks. The research assistants were supervised daily and filled questionnaires were checked daily to ensure the quality of data collection.

Assessment of outcome variables

The dependent (outcome) variable was the behavioural risk factors while the independent variables were the socio-demographic characteristics of the respondents. This was assessed using the questions on tobacco use, alcohol use, unhealthy diets, and physical inactivity.

Knowledge of risk factors for NCDs was scored, wrong answers were scored 0 and right answers scored 1. Mean knowledge scores were computed. The expected maximum score was 10. Knowledge scores were converted to percentages and cut off points used to determine poor knowledge and good knowledge. Those with scores above 70% were classified as having good knowledge, and those with 69% and less were classified as having poor knowledge. Risk behaviours are as specified by the WHO STEPS handbook [24].

Current cigarette smoking: This was defined as any respondent who had smoked at least one cigarette in the last 30 days preceding the survey.

Alcohol use: male respondents who report an average daily alcohol consumption of more than 2 drinks. Female respondents who report an average daily alcohol consumption of more than 1 drink. Also, respondents who reported 6 or more alcoholic drinks at a sitting were classified as having excessive alcohol use [24, 31].

Physical inactivity: respondents who report no physical activity in form of a formal exercise regimen and who mostly sit, or stand were classified as sedentary [24, 31], those who had less than 5 days of < 60 minutes moderate-to-vigorous physical activity in the past 7 days preceding the survey were identified as being physically inactive. Physical activity included walking or riding a bicycle to school, playing football, running, and jogging.

Unhealthy diet: 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 vegetable/fruit consumption in the last 1 week. 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 or less than once a day [24, 31].

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

Data management

Data were entered and analysed using SPSS version 21. Means and standard deviations were used to summarize quantitative variables. Summary statistics were generated and presented appropriately. All categorical variables were compared using the chi-square test while quantitative data were compared using the t-test. Variables significant at 10% on bivariate analysis as well as variables believed apriori to be related to the outcome variables were selected and fit into multivariate logistic regression models to identify predictors of these risk factors. Crude and adjusted odds ratios and 95% confidence intervals were reported. The significance level for all statistical tests was set at 5%.

Ethical considerations

Ethical approval was obtained from the Oyo State Ethical Research Committee (AD 13/479/694). Permission was obtained from the school authorities, and written informed consent from each participant. Each participant was informed of their right to decline or withdraw from the study at any time without adverse consequences.

Results

A total of 1,254 respondents were approached to participate in the study of which 1200 (public: 50 %; private: 50%) completed the study, giving a response rate of 95.7%. The sociodemographic characteristics of the study participants are shown in Table I. Of a total of 1,200 respondents, 47.8% were aged 15-19 years, male (56.3%), never married (96.7%), Christian (82.7%), and Yoruba by tribe (79.4%). Overall, the highest proportion (60.6%) of respondents were 200 level students and a higher proportion (56.0%) lived on campus. A significantly higher proportion (48.4%) of the respondents from the public university were from science-related faculties compared with 41.9% of those from the private university ($p < 0.001$). More students from the public university (69.5%) than private (42.5%) lived on campus ($p < 0.001$). The variables that showed statistically significant differences between students of the public and private universities were age ($p < 0.001$), sex ($p < 0.001$), marital status ($p < 0.001$), fathers' ($p < 0.001$) and mothers' levels of education ($p < 0.001$). A higher proportion (52.8%) of respondents from the private university

Tab. I. Respondents sociodemographic characteristics.

Characteristics	Public university (N = 600) n (%)	Private university (N = 600) n (%)	Total (N = 1,200) n (%)	X^2 value	P-value
Age groups (in years)					
15-19	257 (42.8)	317 (52.8)	574 (47.8)	6.073	0.014*
20-24	280 (46.7)	208 (34.7)	488 (40.7)		
25-29	55 (9.2)	54 (9.0)	109 (9.1)		
30-34	8 (1.3)	21 (3.5)	29 (2.4)		
Mean age	20.6 ± 3.0	20.1 ± 3.9	20.4 ± 3.5	20.622#	< 0.001*
Sex					
Male	373 (62.2)	273 (45.5)	676 (56.3)	3.224	< 0.001*
Female	227 (37.8)	327 (54.5)	554 (43.7)		
Marital status					
Ever married	9 (1.5)	31 (5.2)	40 (3.3)	12.517	<0.001
Never married	591 (98.5)	569 (94.8)	1,160 (96.7)		
Religion					
Christianity	502 (83.7)	491 (81.8)	993 (82.7)	0.706	0.401
Others	98 (16.3)	109 (18.2)	207 (17.3)		
Tribe					
Yoruba	484 (80.7)	469 (78.2)	953 (79.4)	1.147	0.284
Others	116 (19.3)	131 (21.8)	247 (20.6)		
Fathers' educational level					
Never attended	0 (0.0)	0 (0.0)	0 (0.0)	5.126	< 0.001*
Primary	35 (7.8)	23 (4.2)	58 (7.0)		
Secondary	122 (20.6)	86 (14.9)	208 (17.3)		
Tertiary	254 (42.7)	187 (31.9)	441 (36.8)		
Postgraduate	173 (28.9)	294 (49.0)	467 (38.9)		
Mothers' educational level					
Never attended	19 (3.1)	17 (2.8)	36 (3.0)	3.853	< 0.001*
Primary	42 (7.0)	30 (5.0)	72 (6.0)		
Secondary	136 (22.7)	105 (17.5)	241 (20.1)		
Tertiary	280 (46.7)	228 (38.0)	508 (42.3)		
Postgraduate	123 (20.5)	220 (36.7)	343 (28.6)		

Others: Ijaw, Urhobo, Efik; #: independent t-test; *: significant association; X^2: Chi square.

were aged between 15-19 years compared to 42.8% of the public university students. Also, a higher proportion (54.5%) of respondents from the private university were females compared to 37.8% from the public university.

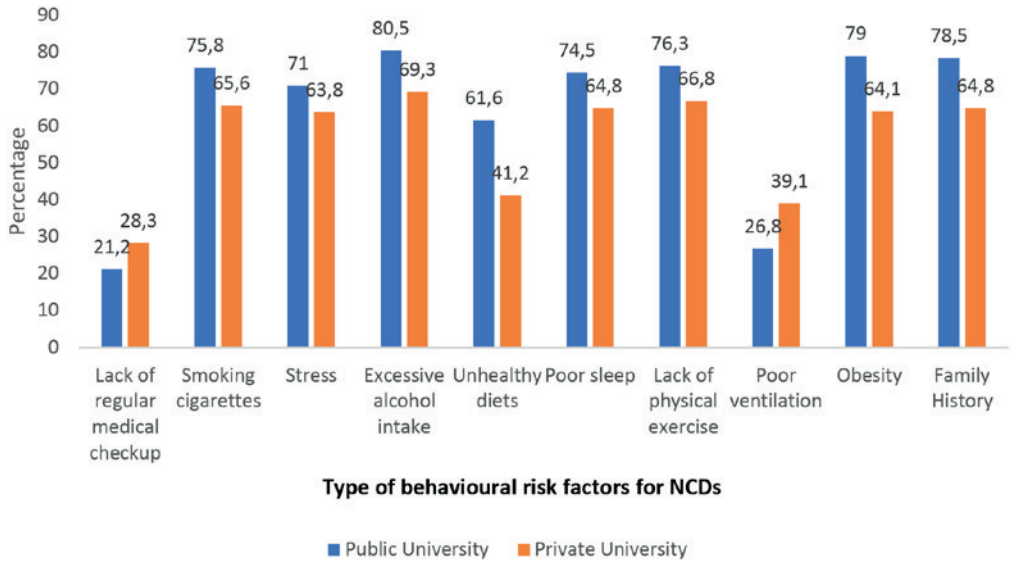
Regarding the knowledge of the behavioural risk factors for NCDs, excessive alcohol intake was the most often identified behaviour among respondents from both universities (public: 80.5%; private: 69.3%) shown in Figure 1. A significantly higher proportion of the students from the public university had good knowledge of risk factors or behaviours for NCDs 364 (60.7%) compared with 257 (42.8%) of the students from the private university ($X^2 = 38.201$; $p < 0.001$). Respondents who were aware of a school policy on alcohol were 60.8% and 46.6% in the public and private university respectively ($X^2 = 24.254$; $p < 0.001$). Only 31.5% and 23.9% of respondents from the private and public university, respectively had ever attended a seminar or program on NCDs prevention/management ($X^2 = 8.708$; $p = 0.003$). Those who had heard about NCD risk factors on the University radio were 26.5 and 21.7% from the private and public university, respectively ($X^2 = 4.834$; $p = 0.089$).

Table II shows the prevalence of risk factors for NCDs among respondents in both universities. Overall, 68.3% had unhealthy diets and 70.6% were classified as being physically inactive. Only, 3.1% were current smokers and 51.3% reported alcohol use. A significantly lower proportion of respondents from the public university (66.0%) had unhealthy diets, compared to 70.6% of respondents from the private university ($X^2 = 29.97$; $p < 0.001$).

Overall, 99.3% of all respondents had at least one behavioural risk factor. In total, only 8.5% of all the respondents had 3 risk behaviours. About 44.5% of respondents from the public university and 46.3% from the private university reported 2 risk behaviours each shown in Figure 2.

However, regarding private university respondents, when reported risk behaviours were disaggregated by gender, females had a higher prevalence of unhealthy diets (55.2%) compared with males (44.8%). Also, physical inactivity was higher in females (53.3%) compared with males (46.7%) as shown in Table III. In the public university, physical inactivity was also higher in females (50.3%) than in males (49.7%).

Fig. 1. Proportion of respondents with correct answers to questions on risk behaviours by university.



Tab. II. Prevalence of behavioural risk for NCDs between respondents in a private and public university.

Variables	Public university N = 600 n (%)	Private university N = 600 n (%)	Total N = 1,200 n (%)	X_2 value	P-value
Unhealthy diets					
Yes	396 (66.0)	424 (70.6)	820 (68.3)	29.97	< 0.001*
No	204 (34.0)	176 (29.3)	380 (31.7)		
Physical activity					
Yes	187(31.2)	165 (27.5)	352 (29.3)	7.085	0.008
No	413 (68.8)	435 (72.5)	848 (70.6)		
Current smoking					
No	582 (97.0)	581 (96.8)	1,163 (96.9)	0.636	0.425
Yes	18 (3.0)	19 (3.1)	37 (3.1)		
Alcohol use					
No	201 (33.5)	383 (63.8)	584 (48.6)	0.314	0.575
Yes	399 (66.5)	217 (36.2)	616 (51.3)		
Overall behavioural risk factor					
No risk factor	2 (0.3)	6 (1.0)	8 (0.7)		0.287^
Has risk factor	598 (99.7)	594 (99.0)	1,192 (99.3)		

*: significant association; ^: Fisher's exact reported.

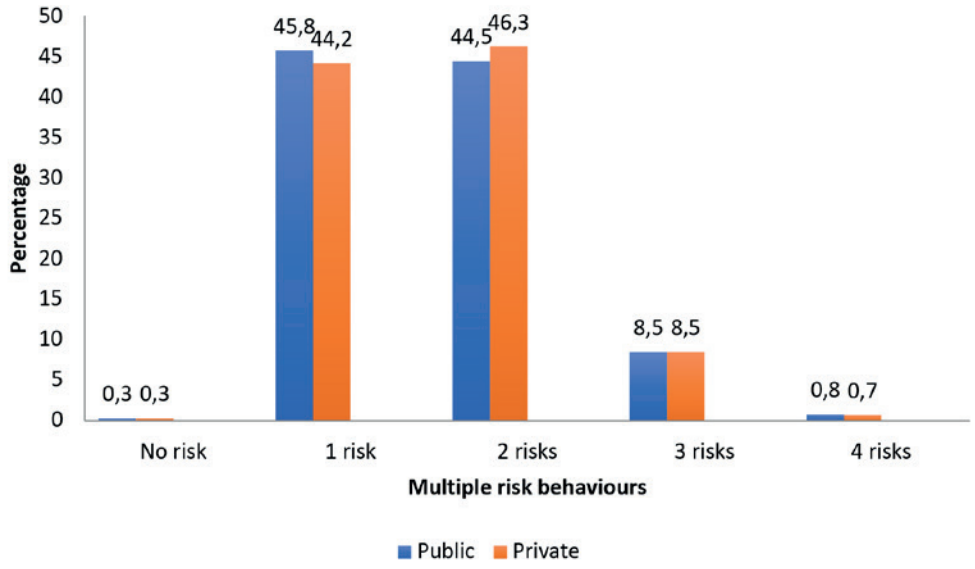
In the public university, males had a higher prevalence of alcohol use (88.2%) compared to females (11.8%) and current smoking (94.4%) compared to 5.6% among females. Similarly, males in the private university recorded a much higher gender difference in the prevalence of alcohol use (89.4%) compared to 10.6% in females and current smoking (78.9%) compared to 21.1% in females ($X^2 = 10.32$; $p = 0.001$).

Table IV shows the association between socio-demographic variables of respondents and behavioural risk factors for NCDs. No socio-demographic variable/family-related characteristic varied significantly with the behavioural risk factors among respondents from both universities.

In the private university, more females (99.4%), more young people [aged 15-24 years (99.0%)], more 200 level students (98.7%), who resided off campus (98.8%) and whose fathers completed more than secondary school 476 (99.0%) had any/at least 1 of the behavioural risk factors for NCDs. None of these were statistically significant.

Similarly, among respondents from the public university, more males (99.5%), more young people (aged 15-24), (99.6%), more 200 level students (99.7%), who resided on campus (99.5%) and whose fathers completed more than secondary school (99.5%) had any of the behavioural risk factors for NCDs. None were statistically significant. This regression model included the type of university, sex, and place of residence which were factors significant at 10% and bivariate analysis. The predictors of

Fig. 2. Prevalence/clustering of multiple behavioural risk factors for NCDs.



Tab. III. Sex-specific prevalence of individual behavioural risks of NCDs among respondents in a private and public university.

Variables	Private university		Public university	
	Male	Female	Male	Female
Unhealthy diets	**(N = 424)**		**(N = 396)**	
Yes	190 (44.8)	234 (55.2)	283 (71.5)	113 (28.5)
	X^2 = 1.672; p-value = 0.196*		X^2 = 1.043; p-value = 0.307	
Physical activity	**(N = 435)**		**(N = 413)**	
Inadequate	203 (46.7)	232 (53.3)	205 (49.7)	208 (50.3)
	X^2 = 10.321; p-value = 0. 001*		X^2 = 8.609; p-value = 0.003*	
Current smoking	**(N = 19)**		**(N = 18)**	
Yes	15 (78.9)	4 (21.1)	17 (94.4)	1 (5.6)
	X^2 = 0.029; p-value = 0.864		X^2 = 5.273; p-value = 0.022*	
Alcohol use	**(N = 217)**		**(N = 399)**	
Yes	194 (89.4)	23 (10.6)	352 (88.2)	47 (11.8)
	X^2 = 0.943; p-value = 0.331		X^2 = 2.962; p-value = 0.085	

*: significant association.

prevalence of the behavioural risk factors for non-communicable diseases among respondents from both universities are shown in Table V. Those more likely to have behavioural risk factors for NCDs were females OR = 1.28 (CI = 1.034-1.946) and this was statistically significant (p = 0.025).

Discussion

This study was conducted to assess the prevalence of the major modifiable behavioural risk factors for non-communicable diseases among undergraduates We also assessed their knowledge of these risk behaviours. Regarding knowledge, about sixty percent of students in the public university and about forty-two percent in the private university had good knowledge of the risk factors for non-communicable diseases. Knowledge scores less than seventy percent was categorized as poor, for this study. They also reported alcohol use most commonly as a risk factor for non-communicable diseases. These findings are similar to findings from studies done among undergraduates in other countries, Myanmar and Malaysia, among medical and pharmacy undergraduates, respectively who had fair to good knowledge of NCD risk factors [25, 26]. In contrast, studies among rural adolescents in Nigeria and India revealed only 0.3% had a good level of knowledge regarding the lifestyle risk factors for NCDs and 62.6% were not aware of the prevention of NCDs [14, 27]. Reasons for these findings may include access to health information on the internet, contact with health care workers in clinics when registering in school or when they present when ill. This may also be due to preponderance of health information on all forms of media, IEC materials, health programs organized by non-governmental organizations or faith-based organizations, or the school during the academic session. These findings among adolescents in rural areas may be due to

Tab. IV. Association between socio-demographic variables and behavioural risk factors among respondents I.

Variables	Private university (n = 600)		Public university (n = 600)	
	Any behavioural risks for NCDs		Any behavioural risks for NCDs	
	Has risk n (%)	No risk n (%)	Has risk n (%)	No risk n (%)
Sex				
Male	269 (98.5)	4 (1.5)	371 (99.5)	2 (0.5)
Female	325 (99.4)	2 (0.6)	227 (100.0)	0 (0.0)
	X^2 = 1.095; p-value = 0.419^		X^2 = 1.221; p-value = 0.529^	
Age group				
	(N = 594)			
15-24 years	520 (99.0)	5 (1.0)	535 (99.6)	2 (0.4)
> 24 years	74 (98.7)	1 (1.3)	63 (100.0)	0 (0.0)
	X^2 = 0.096; p-value = 0.553^		X^2 = 0.253; p-value = 1.000^	
Level				
200	391 (98.7)	5 (1.3)	330 (99.7)	1 (0.3)
300	140 (100.0)	0 (0.0)	147 (99.3)	1 (0.7)
400	54 (98.2)	1 (1.8)	119 (100.0)	0 (0.0)
500	9 (100.0)	0 (0.0)	2 (100.0)	0 (0.0)
	X^2 = 2.153; p-value = 0.314#		X^2 = 0.936; p-value = 0.817#	
Residence in school				
	(N = 594)			
On-campus	254 (99.2)	2 (0.8)	415 (99.5)	2 (0.5)
Off-campus	340 (98.8)	4 (1.2)	183 (100.0)	0 (0.0)
	X^2 = 0.216; p-value = 1.000^		X^2 = 0.881; p-value = 1.000^	
Father's educational level				
	(N = 594)		(N = 598)	
Less than Secondary	33 (100.0)	0 (0.0)	51 (100.0)	0 (0.0)
Secondary level	85 (98.8)	1 (1.2)	122 (100.0)	0 (0.0)
Tertiary level	476 (99.0)	5 (1.0)	425 (99.5)	2 (0.5)
	X^2 = 0.364; p-value = 0.707#		X^2 = 0.813; p-value = 0.506#	
Knowledge of risk factors				
	(N = 594)		(N = 598)	
Poor knowledge	339 (98.8)	4 (1.2)	236 (100.0)	(0.0)
Good knowledge	255 (99.2)	2 (0.8)	362 (99.5)	2 (0.5)
	X^2 = 0.223; p-value = 1.000^		X^2 = 1.301; p-value = 0.522^	

^: Fisher's exact reported; #: likelihood ratio reported.

Tab. V. Predictors of prevalence of behavioural risk factors for NCDs among respondents.

Variable N = 1,200	Odds ratio	95% Confidence Interval		P-value
		Lower	Upper	
Type of university				
Public Private	1 0.82	0.640	1.873	0.192
Sex				
Male Female	1 1.28	1.034	1.946	0.025*
Place of residence				
On-campus Off-campus	1.23 1	0.835	1.819	0.293

less exposure to media or opportunities to interact with health communication materials which may be available in urban areas. While the challenge may be more acute in rural areas and among less-educated youths [26], variable gaps in knowledge have been reported among in-school youths. For example, in a 2017 study, over 30% of undergraduates did not know any preventive measure for diabetes mellitus in a tertiary institution in a south-western state in Nigeria [17]. The findings in the universities enrolled for this study buttresses the fact that a good number of undergraduates have some knowledge of the risk factors for NCDs, however, more still needs to be done to improve both knowledge of and prevention of these risk factors.

Also, the study observed that knowledge of the risk factors was significantly higher among students from the public university. The reason for this difference is unknown but may be due to the increased presence and participation of students from public universities in organizations that provide awareness programs on a wide range of issues. No relationship was found between knowledge and demographic variables except age. This indicates that the pattern of exposure to information about the risk behaviours or factors for NCDs is similar for the different demographic groups in both school categories. The university radio and in-school seminars were some of the routes through which students access information about risk factors for NCDs. Some other studies have also cited friends, family members, the media, and social media -which is very popular among undergraduates- as avenues where young people can learn about these behavioural risk factors [16].

Our study revealed a widespread prevalence of various risk factors for non-communicable diseases in both universities. Regarding gender differences, females had a higher prevalence of unhealthy diets (in the private university) and physical inactivity in both universities. While males had a higher prevalence of alcohol use and current smoking compared to the females in both schools.

The most prevalent risk factors were physical inactivity and unhealthy diets in both universities. The high prevalence of poor diet (89.5%) and physical inactivity (85.9%) was also corroborated in the study among adolescents in South-west Nigeria [14]. Also, physical activity was assessed in another study in the school area during leisure time, and about four-fifths of the students were sedentary in school with a little over two-thirds reporting physical activity outside school time, corroborated by a study among undergraduates in two countries [16, 25]. This may be possibly due to prolonged sitting in classes for lectures and convenience eating which is popular among undergraduates. Similar to the evidence from other regions, respondents were generally not committed to regular physical activities even when aware of the importance. Some of the reasons given were lack of motivation, lack of time, distance from their rooms to places of exercise, and lack of social support [25]. Interestingly, the built environment of the universities provides the opportunity for targeted interventions that encourage physical activities (by improving knowledge and linking it to action) among undergraduates resident in and around the university environment.

The prevalence of tobacco smoking was 3.0 and 3.1% respectively in the public and private university, similar to the findings of another study among undergraduates in Ibadan done in 2010 [13]. This is much lower than what was recorded across other developing countries like Burma (12.6%) to Bangalore India (70%). However, consistent with findings from other studies, males and those slightly older had higher smoking rates [17]. Apart from cigarettes, some of these respondents also smoked hookah/shisha, pipe, and e-cigarettes. Tobacco smoking is generally more easily accessible, can be bought online, in restaurants, and increasingly, females (though less than males) are also engaging in this behaviour [17]. Alcohol use by respondents in this study was lower than rates from some other countries. Similar to other local and studies conducted outside Africa, more males than females reported excessive use of alcohol [9, 25]. This is probably explained by maybe higher alcohol tolerance and social acceptability of the drinking culture among males [31].

No respondent consumed the recommended five fruit and vegetable servings per day, despite the expanded definition used for this study. Seasonal variations in fruit supply and sometimes the occasional prohibitive costs of some fruits may be possible contributors. In addition to the inadequate intake of fruits and vegetables, many respondents also had unhealthy eating habits of daily consumption of soda/soft drinks, and other diets high in sugar and fats. In this study, more males than females consumed unhealthy diets in the public university as opposed to what was observed in the private university; the former contrasting with findings from 2 universities in the same southwestern region of Nigeria, where more females consumed unhealthy diets corroborated by findings in the private university [18, 29].

Overall, 99.3% of all respondents had at least one behavioural risk factor. In total, only 8.5% of all the respondents had 3 risk behaviours. About 44.5% of respondents from the public university and 46.3% from the private university reported 2 risk behaviours each. These findings are corroborated by the study among adolescents in South-west Nigeria which explored the clustering of risk factors for non-communicable diseases [16]. This finding underscored the observation that risk behaviours tend to cluster in population groups [16].

The prevalence of multiple risk factors was substantial in this study irrespective of the university type. Less than 1% of all respondents had no behavioural risk factor at all. This is a very important finding necessitating urgent steps taken in line with national guidelines to address the NCD epidemic in Nigeria. Furthermore, less than 10% of all the respondents reported themselves having self-perceived risks for NCDs. It may be this lack of self-awareness that has prevented many from commencing or sustaining healthy lifestyles.

Limitations of the study

This study has a few limitations. First, the cross-sectional design did not allow inferences to be drawn regarding causal relationships among variables. Secondly, the study sample is only representative of undergraduate students in the University community and findings may not be generalizable to other urban settings or out of school youth in Nigeria. Second, risk behaviours were self-reported and not validated by objective measures, respondents might tend to give answers that would convey more favourable behaviours, such as understating alcohol/tobacco use (social desirability bias). Recall bias was a potential limitation because many incidents brought up had taken place, weeks previously. This was minimized by using both standardized and recheck questions. De-

spite these limitations, the study provides insight into the risk profile of multiple lifestyle behaviours as a useful source of evidence to quantify behaviour and health at the population level especially among age groups where behaviours adverse to health are best targeted.

Conclusion

Our lifestyle choices shape our health status and most of these are imbibed from a young age.
While the environment and family history play significant roles, risky health behaviors such as alcohol use and unhealthy diets continue to contribute to the occurrence of NCDs. Many of the respondents had individual risks for NCDs. There is a need for continued surveillance of NCDs and their risk factors to provide data-driven targeted interventions for prevention for relevant population segments.

Recommendations

Therefore, there is a need for continued surveillance of NCDs and their risk factors to provide data-driven targeted interventions for NCD prevention for relevant population segments.
Tertiary institutions alongside their health services units can also implement campus-wide programs to encourage healthy behaviour such as bans on tobacco or alcohol sale within campuses and routine distribution of IEC materials.

Acknowledgements

Funding sources: this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

OFO, AMA, OAP contributed to the conceptualization, OFO collected the data, OFO, AMA, OAP contributed to data analysis, the write up and the draft submitted.

References

[1] Wagner, Karl Heinz, Helmut Brath. A global view on the development of non-communicable diseases. Prev Med 2012;54(Suppl):S38-41. https://doi.org/10.1016/j.ypmed.2011.11.012

[2] World Health Organization. Non-communicable diseases country profiles 2014. Available at: http://apps.who.int/iris/bitstream/handle/10665/128038/9789241?sequence=1 (accessed 24/05/2018).

[3] World Health Organization. NCD mortality and morbidity 2017. Available at: http://www.portal.pmnch.org/global-coordination-mechanism/ncd-themes/ncd-and-youth/en (accessed 10/12/2017).

[4] Prentice AM. The emerging epidemic of obesity in developing countries. Int J Epidemiol 2006;35:93-9. https://doi.org/10.1093/ije/dyi272

[5] Boutayeb A. The double burden of communicable and non-communicable diseases in developing countries. Trans R Soc Trop Med Hyg 2006;100:191-1.

[6] Kim HC, Oh SM. Non-communicable diseases: current status of major modifiable risk factors in Korea. J Prev Med Public Health 2013;46:165-72. https://doi.org/10.3961/jpmph.2013.46.4.165

[7] Centre for Disease Control and Prevention (CDC). Overview of non-communicable diseases and related risk factors. Available at: https://www.cdc.gov/globalhealth/healthprotection/fetp/training_modules/new-8/overview-ncds_fg_qa-review_091113.pdf

[8] Remais J V, Zeng G, Li G, Tian L, Engelgau MM. Convergence of non-communicable and infectious diseases in low- and middle-income countries. Int J Epidemiol 2013;42:221-7. https://doi.org/10.1093/ije/dys135

[9] Adekeye OA, Adeusi SO, Chenube OO, Ahmadu FO, Sholarin MA. Assessment of alcohol and substance use among undergraduates in selected private universities in Southwest Nigeria. IOSR-JHSS 2015;20:1-7.

[10] Bloom DE, Cafiero ET, Jané-Llopis E, Abrahams-Gessel S, Bloom LR, Fathima S, Feigl AB, Gaziano T, Mowafi M, Pandya A, Prettner K, Rosenberg L, Seligman B, Stein AZ, Weinstein C. The global economic burden of noncommunicable diseases. Geneva: World Economic Forum 2013. Available at: http://www3.weforum.org/docs/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases_2011.pdf

[11] Fawibe AE, Shittu AO. Prevalence and characteristics of cigarette smokers among undergraduates of the University of Ilorin, Nigeria. Niger J Clin Pract 2011;14:201-5. https://doi.org/10.4103/1119-3077.8401

[12] Beaglehole R, Bonita R, Horton R, Adams C, Alleyne G, Asaria P, Baugh V, Bekedam H, Billo N, Casswell S, Cecchini M, Colagiuri R, Colagiuri S, Collins T, Ebrahim S, Engelgau M, Galea G, Gaziano T, Geneau R, Haines A, Hospedales J, Jha P, Keeling A, Leeder S, Lincoln P, McKee M, Mackay J, Magnusson R, Moodie R, Mwatsama M, Nishtar S, Norrving B, Patterson D, Piot P, Ralston J, Rani M, Reddy KS, Sassi F, Sheron N, Stuckler D, Suh I, Torode J, Varghese C, Watt J; Lancet NCD Action Group; NCD Alliance. Priority actions for the non-communicable disease crisis. Lancet 2011;377:1438-7. https://doi.org/10.1016/S0140-6736(11)60393-0

[13] Adegoke, Babatunde OA, Adewale L. Oyeyemi. Physical inactivity in Nigerian young adults: prevalence and sociodemographic correlates. Journal of Physical Activity and Health 2011;8:1135-42. https://doi.org/10.1371/journal.pone.0190124

[14] Idowu A, Fatusi AO, Olajide FO. Clustering of behavioural risk factors for non-communicable diseases (NCDs) among rural-based adolescents in south-west Nigeria. Int J Adolesc Med Health 2016;30:/j/ijamh.2018.30.issue-1/ijamh-2016-0008/ijamh-2016-0008.xml. https://doi.org/10.1515/ijamh-2016-0008

[15] Owoaje E, Bello J. Psychoactive substance use among undergraduate students of the University of Ibadan, Nigeria. Trop J Health Sci 2010;17:56-60. https://doi.org/10.4314/tjhc.v17i2.61034

[16] Aliyu SU, Chiroma AS, Jajere AM, Kachalla Gujba F. Prevalence of physical inactivity, hypertension, obesity and tobacco smoking: a case of NCDs prevention among adults in Maiduguri, Nigeria. Am J Med Sci Med 2015;3:39-47.

[17] Elegbede OE, Babatunde OA, Ayodele LM, Atoyebi OA, Ibirongbe DO, Adeagbo AO. Cigarette smoking practices and its determinants among university students in Southwest, Nigeria.

Cigarette Smoking Practices and Its Determinants Among University Students in Southwest, Nigeria. Journal of Asian Scientific Research 2012; 2:1-10. Available at: http://eprints.abuad.edu.ng/id/eprint/20033

[18] Otemuyiwa IO, Adewusi SR. Food choice and meal consumption pattern among undergraduate students in two universities in Southwestern Nigeria. Nutr Health 2012;21:233-45. https://doi.org/10.1177/0260106013510994

[19] National Population Commission. National Population Commission of Nigeria. Available at: http://www.population.gov.ng

[20] List of schools in Oyo state. Oyo state government website: http://oyomesischools.com.ng/_gov/public.php (accessed on 02/03/2018).

[21] University of Ibadan, undergraduate admissions, University of Ibadan website: https://www.ui.edu.ng/History

[22] Undergraduate admissions lead city university. Lead city university website: https://www.lcu.edu.ng/index.php/all-courses

[23] Suresh K, Chandrashekara S. Sample size estimation and power analysis for clinical research studies: retraction [retraction of: Suresh K, Chandrashekara S. J Hum Reprod Sci 2012;5:7-13]. J Hum Reprod Sci 2015;8:186. https://doi.org/10.4103/0974-1208.165154

[24] WHO. STEPS instrument overview. World Health Organization 2017, p. 68. Available at: https://www.who.int/ncds/surveillance/steps/manual/en/index1.html (accessed on 23/7/2018).

[25] Htay SS, Oo M, Yoshida Y, Harun-Or-Rashid M, Sakamoto J. Risk behaviours and associated factors among medical students and community youths in Myanmar. Nagoya J Med Sci 2010;72:71-81.

[26] Elnaem MH, Jamshed SQ, Elkalmi R. Knowledge of the risk factors of non-communicable diseases (NCDs) among pharmacy students: findings from a Malaysian University. Int J Health Promot Educ 2019;57:217-28. https://doi.org/10.1080/14635240.2019.1602070

[27] Anju A, Chethana KV, Abhay Mane, SG Hiremath. Non-communicable diseases: awareness of risk factors and lifestyle among rural adolescents. Int J Biol Med Res 2014;5:3780-4.

[28] Riley L, Guthold R, Cowan M, Savin S, Bhatti L, Armstrong T, Bonita R. The World Health Organization STEPwise approach to noncommunicable disease risk-factor surveillance: methods, challenges, and opportunities. Am J Public health 2016;106:74-8. https://doi.org/10.2105/AJPH.2015.302962

[29] Deliens T, Clarys P, De Bourdeaudhuij I, Deforche B. Determinants of eating behaviour in university students: a qualitative study using focus group discussions. BMC Public Health 2014;14:53. https://doi.org/10.1186/1471-2458-14-53

[30] Yadiyal A, Mittal S, Shenoy N, Chopra A, Mitra P, Post, et al. Tobacco use among undergraduates of a private medical college in Mangalore-knowledge, attitude, and practice. Int J Sci Res Publ 2015;5(8).

[31] WHO. Chapter 3-Monitoring NCDs and their risk factors: a framework for surveillance. In: WHO Global Status Report on Noncommunicable Diseases. 2010, pp. 41-5.

Received on April 2, 2020. Accepted on July 20, 2020.

Correspondence: Oluwatomi Owopetu. Department of Community Medicine, University College Hospital, Ibadan, Nigeria - E-mail: oluwatomifunbi@gmail.com

How to cite this article: Owopetu OF, Adebayo AM, Popoola OA. Behavioural risk factors for non-communicable diseases among undergraduates in South-west Nigeria: knowledge, prevalence and correlates: a comparative cross-sectional study. J Prev Med Hyg 2020;61:E568-E577. https://doi.org/10.15167/2421-4248/jpmh2020.61.4.1523