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Knowledge, awareness, and presence of cardiovascular risk factors among college staff of a Nigerian University

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Abstract

Background Cardiovascular diseases (CVDs) are the leading cause of global morbidity often overlooked. Much of the population risk of CVD is attributable to modifiable risk factors, and the gaps in knowledge of cardiovascular risk factors (CRF) are barriers to the effective prevention and treatment of CVDs.

Aim To assess the knowledge, awareness, and CVD risk among the staff of the college of health science.

Methods A cross-sectional study of 70 academic and non-academic staff who consented were given questionnaires for cardiovascular risk factor (CRF) knowledge level, cardiovascular risk awareness (CRA), international physical activity questionnaire (IPAQ), and international stress management association questionnaire (ISMAQ). Selected anthropometric indices, blood pressure, and fasting blood sugar (FBG) were also measured.

Results The mean knowledge level of CVDs was 23.21 ± 3.230, and the mean CRA was 42.61 ± 4.237. The study participants demonstrated moderate-to-high stress (48%), physical inactivity of 18.9%, overweight/obesity of 62.48%, abdominal obesity of 21.4%, hypertensive (systole and diastole) of 27.2%, hyperglycemic of 7.2%, and smokers of 7.2%. There was a significant relationship between the participants' knowledge level and awareness of CVDs ($p < 0.003$) and knowledge of CRFs also increased with an increase in educational level. Participants > 40 years had a 3–9% risk of having a CVD event within 10 years.

Conclusions The knowledge and awareness of CRFs among the participants was high, and some exhibited risk factors. The staff of the university could improve their risk score by practicing health-promoting behaviors like increased physical activity, blood pressure control, and smoking cessation.

Keywords Anthropometric indices, Cardiovascular diseases, Physical activity, Risk factors

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Background

Cardiovascular diseases (CVDs) are the leading cause of death globally. An estimated 17.9 million people died from CVDs in 2019, representing 32% of all global deaths. Of these deaths, 85% were due to heart attack and stroke. Over three-quarters of CVD deaths take place in low- and middle-income countries. Out of the 17 million premature deaths (under the age of 70) due to noncommunicable diseases in 2019, 38% were caused by CVDs [1, 2]. Cardiovascular disease (CVD) is not an actual disease in itself; rather, it is a lifestyle disease that is defined as a heart and blood vessel disease, also known as heart disease [3]. The American Heart Association (2017) refers to cardiovascular diseases as several conditions including but not limited to heart disease, heart attack, stroke, heart failure, arrhythmia, and heart valve problems.

The leading CVD cause of death and disability in 2010 in sub-Saharan Africa (SSA) was a stroke, and CVD deaths in sub-Saharan Africa occur at younger ages on average than in the rest of the world [4]. Many prospective cohort studies have demonstrated that hypertension is a strong risk factor for total mortality and cardiovascular disease [5]. A previous report has shown that 38% of people suffering strokes are middle-aged (40-69), and the average age for a woman suffering a stroke has dropped from 75 to 73 and for men, it has dropped from 71 to 68 [6]. The annual incidence rate of stroke in Africa is up to 316 per 100,000 individuals, which is within the highest incidence rates in the world, and the prevalence rate of 1460 per 100,000 reported in one region of Nigeria, western Africa, is clearly among the highest in the world [7]. According to a meta-analysis of 20 observational studies, hypertensive subjects have poorer levels of health-related quality of life (HRQoL) than non-hypertensive subjects and this lower perception of HRQoL has been related to the frequent presence of comorbidities, with the side effects of antihypertensive drugs (headaches, dizziness, tinnitus, nausea) and, in particular, with the difficulty in being able to control BP through prescribed therapeutic procedures [8]. Disability and mortality attributable to CVDs and the traditional risk factors, including hypertension, obesity, diabetes mellitus, and dyslipidemia, continue to rise in several SSA countries, and in 2013, an estimated 1 million deaths were attributable to CVD in SSA, constituting 5.5% of all global CVD-related deaths and 11.3% of all deaths in Africa [9]. The CVD burden has major ramifications for SSA economies in terms of manpower loss and spiraling healthcare costs, and it also places additional pressure on an already constrained health system in many countries [9].

Cardiovascular epidemiological studies have demonstrated the association of many risk factors with the development of CVDs, which can be caused by both modifiable and non-modifiable predisposing risk factors and can be prevented mainly through health-promoting lifestyle interventions [3, 10]. Non-modifiable risk factors are the factors that cannot be controlled and they include age, gender, genetics, and ethnicity [11]. A study revealed that age was a main non-modifiable risk factor of CVD and increasing age increases the chances of getting CVD but as a result of modernization associated with the modifiable risk factors for CVD, it now affects all age groups [3].

Much of the population's risk of CVD is attributable to nine modifiable traditional risk factors, including smoking, history of hypertension or diabetes, obesity, unhealthy diet, lack of physical activity, excessive alcohol consumption, raised blood lipids, and psychosocial factors, which eight of these risk factors (excessive alcohol use, tobacco use, high blood pressure, high body mass index (BMI), high cholesterol, high blood glucose, dietary choices, and physical inactivity) account for 61% of CVD deaths globally [1]. The prevalence of CVD risk factors is dramatically increasing in low- and middle-income African countries, particularly in urban areas [12]. The Global Burden of Disease, Injuries, and Risk Factor Study is the first systematic and comprehensive attempt to map and quantify risk factors and diseases to identify emerging threats to population health and opportunities for prevention [1, 13].

University staff is particularly susceptible to preventable risks for ill health including smoking, physical inactivity, poor nutrition, alcohol consumption, high blood cholesterol, and high blood pressure, and a study cited almost 50% of the university staff surveyed were at high to moderate risk for developing ill-health because they exhibited three or more of these risk factors [14]. Another study showed that the prevalence of non-communicable diseases (NCD) risk factors was found to be substantially high among university employees with unhealthy dietary patterns and physical inactivity being the most prevalent factors [15]. Cardiovascular disease risk factors cannot be ignored without worsening the health indices of Nigeria, rather these risks should be well researched and their preventive strategies well understood. The risk reduction practices include the avoidance of smoking, exercise, healthy eating, avoidance or moderation of alcohol, regular medical check-ups, and risk assessment scoring [16]. A sedentary lifestyle is a major risk for CVD, and university staff are more inclined to live a sedentary lifestyle. Therefore, it is important to find out how knowledgeable they are on the risk factors of CVDs as adequate awareness could help reduce the risk factors. The gaps in the knowledge of CVD conditions and their risk factors in the general population are important barriers to the effective prevention and treatment of CVDs and that is what the current study intends to bridge. The role of knowledge in health behaviors and sustained behavioral changes has been proposed by several models including the health belief model; these models postulate that knowledge of a disease condition influences a patient's attitude and practice improves compliance with treatment and has been shown to lead to a reduction in prevalence and aversion of complications [17]. Success in the implementation of any health promotion program is dependent on context-specific information on knowledge, awareness, and perception of the targeted population. There is however a regional level scarcity of evidence on the knowledge and awareness levels of CVDs and its risk factors among the populations of SSA.

Methods

The study is a cross-sectional survey carried out among academic and non-academic staff of the Faculty of Health Sciences and Technology who were consecutively recruited. The study participants included individuals who were willing to participate and had no cardiac problems before the time of this study. Those individuals who were sick at the time of the study, taking antibiotics, insulin, lipid-lowering drugs, and contraceptives as well as those with a case of cardiovascular diseases such as stroke, hypertensive heart diseases, or heart failure before the time of the study or had an underlying cardiac disease at the time of the study were excluded from the study. The sample size was estimated using the GPower version 3.1.9. A sample size of 71 has 95% power to detect a difference at a moderate effect size of 0.4. The alpha level was set at 0.05.

Before the commencement of this study, ethical approval was obtained from the Ethical Review Committee of the Faculty of Health Sciences, Nnamdi Azikiwe University, Awka. Also, the process and the objectives of the study were explained to the prospective participants, and a written consent document was obtained before the data collation instrument was given to them. Data were collected at the college premises ensuring adequate privacy. Each participant was given a questionnaire to provide data regarding age, marital status, education, knowledge, and awareness of cardiovascular disease risk factors, tobacco use, and alcohol consumption and educated on the necessity to perform a fasting blood sugar test which was carried out the next day before they had breakfast. Their CVD risk knowledge and awareness, BMI, fasting blood glucose, waist circumference, stress levels, physical activity levels, and blood pressure were assessed. Cardiovascular risk knowledge and awareness were assessed using the cardiovascular disease risk factors knowledge level (CARRF-KL) and cardiovascular risk factor (CRF) questionnaires to check the level of individual CVD risk awareness. Both questionnaires were scored by summing up all scores for all the items in the questionnaire.

CARRF-KL consisted of 28 items. The first 4 items were examining the factors like characteristics of CVD, prevention, and age, and 15 items (items 5, 6, 9–12, 14, 18–20, 23–25, 27, 28) were examining the risk factors and 9 items (items 7, 8, 13, 15, 16, 17, 21, 22, 26) were examining the outcome of changes in risk behaviors. All the items were presented in the form of complete true or false statements, requiring participants to respond with "Yes," "No," or "Don't know." Each correct answer was given a score of 1. Six of the statements in the scale were wrong (1, 11, 12, 16, 24, 26), and these were inversely encoded compared to the rest. The maximum total score was determined as 28. The CARRF-KL has been used in other studies with reliable test-retest reliability, internal consistency, and validity [18]. CRF was used to assess their attitude to risk factors, smoking habits, and alcohol consumption. The maximum obtainable score on the questionnaire is 48. Eight of the items are scored on a 2-point scale, while the remaining items were scored on a 5-point scale. For the two-point scale "yes" denotes "1" and "no" denotes "0" except for two items (CRA3c and CRA3f) where "yes" denotes "0" and "no" denotes "1," whereas for the other 5-point scales "Extremely & Very correct" denotes "5," "Very much & Correct" denotes "4," "Much & Undecided" denotes "3," "A little & Incorrect" denotes "2" and "Not at all & Very incorrect" denotes "1." The CRA was categorized as high CRA if the CRA score is >35, moderate CRA if the CRA score is from 25 to 35, and low CRA if is <25 [19]. The level of participant smoking habit or tobacco consumption was assessed by asking the participant if they smoked or not if they consumed cigarettes, Indian hemp, pipes full of tobacco, snuff, etc. (one or more of the listed products), when they started smoking, how frequent they smoked and the number of each product consumed per day. Participant's alcohol consumption was assessed by asking the participants if they took alcohol or not, how many units (bottle) of light (beer, long drinks, or equivalent), how many units (big glass) of moderate (wine, whisky, cognac or equivalent), and how many units (medium glass) of strong (vodka, whisky, cognac or equivalent) alcohol beverage they drank in a week and the frequency of having at least one unit of alcohol drink per week in the past 6 months. The International Stress Management Association Questionnaire (ISMAQ) is a 25-item questionnaire with a total obtainable stress score of 25. It is measured on a two-point scale of yes and no in which "yes" is designed as 1 and "No" as 0. Stress levels were categorized as "low stress" for a score of ≤ 3, "moderate stress" for a score between 4 and 10, and "high stress" if the stress score is >10. Self-reported PA levels of participants were assessed using the short form 7 days International Physical Activity Questionnaire (IPAQ-SF). The IPAQ-SF was scored by rating PA level as multiples of metabolic equivalents (METS) expressed as MET-min per week: vigorous (8 METS), moderate (4 METS), and walking (3.3 METS). The physical activity was classified into 3 groups: inactive—the lowest level of physical activity with less than 600 MET-minutes/week, minimally/moderately active—achieving a minimum of at least 600 MET-minutes/week, and vigorously/HEPA active—achieving a minimum of at least 3000 MET-minutes/week.

Weight was measured in kilograms using a weighing scale. The participant was asked to stand erect on the weighing scale, looking straight, and wearing light clothing. The reading was then taken when the pointer was stabilized. Height was measured in centimeters using a height meter. The participant stood erect, looking straight ahead, and barefoot. The measurement was taken from the vertex of the head. The BMI of the participants was calculated from their respective height in meters and weight in kilograms using the formula: weight (kg)/height (m^2). The systolic and diastolic blood pressure (BP) was measured in a sitting position using an automatic (Andon, KD-595) sphygmomanometer after the participants have rested for at least 5 min. Then, the cuff was wrapped around 2cm above the cubital fossa of the left arm supported at heart level. Consecutive BP values were taken and the average was recorded as the actual BP level. Blood sugar was assessed with the participants' not eating 8–12h before the time of the test using the glucometer. The surface of one of the fingers was wiped clean with an alcohol swab. The glucometer was turned on and a test strip was inserted. A lancet was then used to pierce the tip of the wiped finger, and a drop of blood was placed on the test strip. The result was recorded in mg/dL with values >126mg/dL being recorded as diabetes. CVD risk was calculated using the WHO non-laboratory-based chart to assess each participant's 10-year risk of having a CVD event. It compared each participant's smoking level to their BMI, SBP, and age with the risk being higher for participants above 40 years and above. The risk level was graded using a color code to group the risk level with each color indicating a 10-year risk of a fatal or non-fatal CVD event. It was graded as green (<5%), yellow (5 %–< 10%), orange (10 %–< 20%), red (20 %–< 30%), and deep red (≥30%).

Statistical analysis

The data were analyzed using the IBM SPSS version 23. The data from this study were summarized using proportions, percentages, mean, and standard deviations as well as charts. The data were analyzed using Spearman rank correlation, Kruskal Wallis test, and Mann-Whitney *U*. The alpha level was set at <0.05.

Results

Seventy participants (mean age 36.54 ± 9.961years) were involved in this study. Fifty percent of the study participants were males, about 30% (mostly males) were single, and 37.1% of the female participants were married. The mean values of the knowledge and awareness were CARRF-KL 23.21 ± 3.230 and CRA 42.61 ± 4.237. The physical characteristics, cardiovascular parameters, and risk factors of the participants are presented in Table 1.

According to Table 2, a higher proportion of the male participants recorded higher stress levels, higher systolic and diastolic blood pressure values, and higher blood glucose levels while the majority of the female participants recorded higher values for BMI, waist circumference, and waist-hip ratio. The majority of the participants were moderately active and a significant positive relationship (r= 0.353) between CARRF-KL and CRA with a p value

Table 1 Demographic characteristics and risk factors of participants

Variables	Minimum	Maximum	Mean	Standard deviation
Age	0	63	36.54	9.961
Weight	48	120	74.50	11.893
Height	2	2	1.70	0.095
Average systolic blood pressure	93	175	120.15	13.937
Average diastolic blood pressure	56	126	79.76	11.774
Blood sugar	69	118	89.19	9.681
Waist circumference	0	127	83.84	16.040
CARRF-KL	13	28	23.21	3.230
CRA	27	48	42.61	4.237
Stress	0	3	2.49	0.583
Vigorous physical activity	0	5760	512.69	1112.083
Moderate physical activity	0	4800	551.27	822.104
Walk physical activity	0	8316	975.55	1138.930
Total physical activity	0	9198	2030.08	2080.605
Body mass index	18	37	25.75	3.948

KEY: *CARRF-KL* Cardiovascular Risk Factor Knowledge Level, *CRA* Cardiovascular risk assessment

Table 2 Sex distribution of cardiovascular disease risk factors

Variables	Category	Frequency/percent distribution					Cumulative percent
		Male	Female	Total	Male (%)	Female (%)	
Stress level	Low	18	18	36	25.7	25.7	51.4
	Moderate	17	16	33	24.3	22.9	47.2
	High	0	1	1	0	1.4	1.4
Diastolic blood pressure	Normal blood pressure (< 80)	13	22	35	18.6	31.4	50.0
	Pre-hypertension (80–89)	16	10	26	22.9	14.3	37.1
	Hypertension (>90)	6	3	9	8.6	4.3	12.9
Systolic blood pressure	Normal blood pressure (< 120)	18	20	38	25.7	28.6	54.3
	Pre-hypertension (120–139)	14	14	28	20.0	20.0	40.0
	Hypertension (>140)	3	1	4	4.3	1.4	5.7
Body mass index	Normal weight (18.5–24.9)	14	12	26	20.0	17.1	37.1
	Overweight (25.0–29.9)	17	19	36	24.3	27.1	51.4
	Obesity (≥30.0)	4	4	8	5.7	5.7	11.4
Waist circumference	Normal	33	21	54	47.1	30.0	77.1
	Abdominal obesity	1	14	15	1.4	20.0	21.4
Waist to hip ratio	Low risk	32	12	44	45.7	17.1	62.9
	Moderate risk	1	3	3	0.0	4.3	4.3
	High risk	2	20	22	2.9	28.6	31.4
Physical activity levels	Vigorously active	11	2	13	15.7	2.9	18.6
	Moderately active	20	24	44	28.6	34.3	62.9
	Inactive	4	9	13	5.7	12.9	18.6
Fasting blood glucose	Normal	32	33	65	45.7	47.1	92.9
	Abnormal	3	2	5	4.3	2.9	7.1
Smoking	Non-smoker	30	35	65	42.9	50.0	92.9
	Smoker	5	0	5	7.1	0.0	7.1
Frequency of smoking	Not at all	30	35	65	42.9	50.0	92.9
	Once a month	4	0	4	5.7	0.0	5.7
	Once a week	1	0	1	1.4	0.0	1.4
Amount smoked	0	30	35	65	42.9	50.0	92.9
	1	1	0	1	1.4	0.0	1.4
	≥2	4	0	4	5.7	0.0	5.7
Unit of light alcohol taken (beer or its equivalent)	0	24	32	56	34.3	45.7	80.0
	1	2	2	4	2.9	2.9	5.8
	2	4	1	5	5.7	1.4	7.1
	3	2	0	2	2.9	0.0	2.9
	4	1	0	1	1.4	0.0	1.4
	5	1	0	1	1.4	0.0	1.4
	6	1	0	1	1.4	0.0	1.4
Frequency of intake of above unit	Non-drinkers	24	32	56	34.3	45.7	80.0
	2–3 days	7	2	9	10.0	2.9	12.9
	4–5 days	2	1	3	2.9	1.4	4.3
	>5 days	2	0	2	2.9	0.0	2.9
Unit of moderate alcohol taken (alcoholic wine or its equivalent)	0	28	33	61	40.0	47.1	87.1
	1	2	2	4	2.9	2.9	5.7
	2	2	0	2	2.9	0.0	2.9
	3	0	0	0	0.0	0.0	0.0
	4	2	0	2	2.9	0.0	2.9
	5	1	0	1	1.4	0.0	1.4

Table 2 (continued)

Variables	Category	Frequency/percent distribution					Cumulative percent
		Male	Female	Total	Male (%)	Female (%)	
Frequency of intake of above unit	Non-drinkers	28	33	61	40.0	47.1	87.1
	2–3 days	6	1	7	8.6	1.4	10.0
	4–5 days	1	0	1	1.4	0.0	1.4
	>5 days	0	1	1	0.0	1.4	1.4
Unit of strong alcohol taken (Gin, Vodka or its equivalent)	0	31	34	65	44.3	48.6	92.9
	1	2	1	3	2.9	1.4	4.3
	2	0	0	0	0.0	0.0	0.0
	3	0	0	0	0.0	0.0	0.0
	4	2	0	2	2.9	0.0	2.9
Frequency of intake of above unit	Non-drinkers	31	34	65	44.3	48.6	92.9
	2–3 days	4	1	5	5.7	1.4	7.1

of 0.003 was also found. Figure 1 shows physical activity level in relation to BMI.

Table 3 showed the correlation between CARRF-KL and educational level, depicting that the participants who had a Ph.D. had the highest knowledge of cardiovascular risk factors with a mean rank of 49.29 while the participants with WASSCE had the lowest knowledge of cardiovascular risk factors with a mean rank of 29.19. The CRA in relation to educational level showed higher mean values for participants with a Master's degree and the lowest for participants with a bachelor's degree. The mean rank of the awareness of cardiovascular risk factors of smokers and non-smokers to cardiovascular diseases showed 33.90 and 35.62, respectively. Their knowledge of cardiovascular risk factors mean rank was recorded with the former being 38.30 and the latter 35.28. The majority of the participants (57.1%) were below the age of 40, but participants 40 and above had between 3 and 9% risk of having a CVD event within the next 10 years as seen in Table 4.

Discussion

General awareness of the cardiovascular disease, the knowledge of risk factors for developing cardiovascular diseases, physical activity level, stress, BMI, waist circumference, fasting blood sugar level, and blood pressure

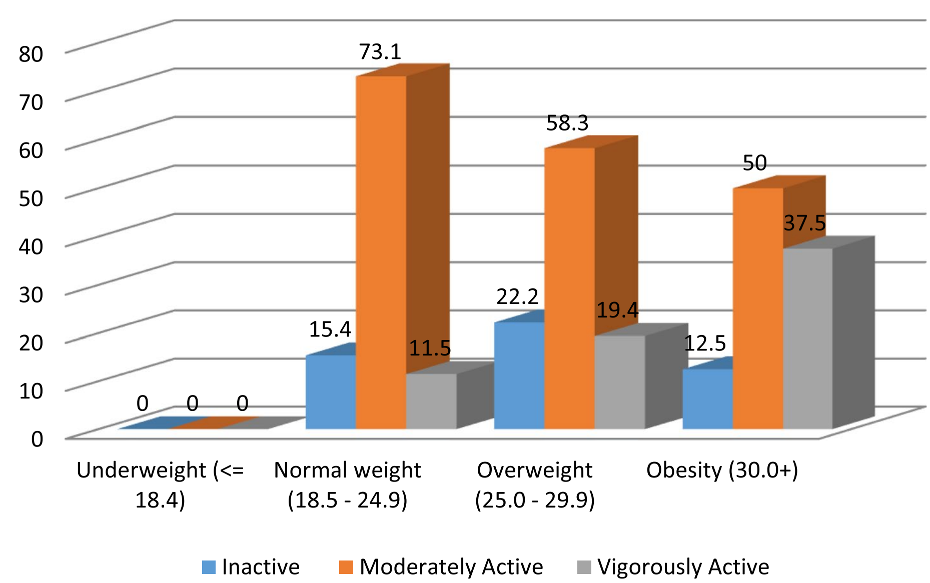

Fig. 1 Bar chart of relationship of BMI with physical activity level

Table 3 Influence of educational levels, smoking, and alcohol unit intake on knowledge and awareness level cardiovascular disease risk factors

Educational level		Frequency (%)	Mean rank	*K*value	*P*value
CARRF-KL	**O-Level**	16 (22.9)	29.19	5.584	0.134
	Bachelor's degree	24 (34.2)	33.04		
	Masters	23 (32.9)	38.26		
	Ph.D.	7 (10)	49.29		
CRA	**O-Level**	16 (22.9)	35.72	2.989	0.393
	Bachelor's degree	24 (34.2)	31.00		
	Masters	23 (32.9)	40.87		
	Ph.D.	7 (10)	32.79		
Smoking			**Mean rank**	***U*value**	***P*value**
CARRFKL	**Non-smoker**		35.28	148.500	0.748
	Smoker		38.30		
CRA	**Non-smoker**		35.62	154.500	0.853
	Smoker		33.90		
Alcohol unit intake			**Mean rank**	***U*value**	***P*value**
CARRFKL	**0**		36.75	9.494	0.148
	1		15.75		
	2		27.60		
	3		51.00		
	4		37.50		
	5		69.00		
	6		17.50		0.646
CRA	**0**		36.99	4.228	
	1		25.13		
	2		31.90		
	3		27.50		
	4		51.00		
	5		38.50		
	6		9.00		

KEY: *CARRFKL* Cardiovascular Risk Factor Knowledge Level, *CRA* Cardiovascular risk awareness

were assessed. The participants were made up of an equal number of male and female participants, and the result of this study corresponds with other literature [20, 21]. The knowledge of cardiovascular risk factors was relatively good in this study population in contrast to some other studies among Staff of Ekiti State University with the majority (68.6%) of the study population having low knowledge [22] and among the staff of Ladoke Akintola University of Technology with a percentage of low, moderate, and high knowledge being recorded as 49.0%, 31.1%, and 19.9%, respectively [23]. The high knowledge reported in our study could be a result of the geographic location and that the population was the staff who worked in a college of health science and this could result in an increase in their level of knowledge of cardiovascular diseases. Aysel Badir's study concurred with this postulation, as it reported that students who had graduated from vocational health schools had a higher mean knowledge score than those who graduated from high schools (the total mean CARRF-KL score was 22.47 ± 3.38 out of a maximum of 28 (female = 22.63 ± 3.31; male = 20.82 ± 3.57)) [24].

The awareness level of cardiovascular risk factors among this population in the current study was generally good, and this finding was supported by a study that showed that more than half of the respondents had high awareness of cardiovascular risk factors [25, 26]. The majority of the participants knew about CVD and were able to describe and identify some CVD conditions although some wrongly identified diabetes and HIV/AIDS as a CVD. Smokers had a higher knowledge of cardiovascular risk factors and a lower awareness level of cardiovascular risk factors. In comparison, a reverse relationship existed for non-smokers who had better awareness of the cardiovascular risk factors and a lower knowledge of cardiovascular risk factors. It was reported in a study carried out on adults in the Muar community

Table 4 Percentage of having a cardiovascular event in 10 years for participants

Percentage of CVD risk (≥40 years)			Sex		Total
			Male	Female	
Percentage of CVD risk (>/=40years)	**0**	Frequency count	1	0	1
		Percent (%)	3.571	0.000	3.571
	3	Frequency count	1	4	5
		Percent (%)	3.571	14.286	17.857
	4	Frequency count	4	3	7
		Percent (%)	14.286	10.714	25.000
	5	Frequency count	4	2	6
		Percent (%)	14.286	7.143	21.429
	6	Frequency count	2	3	5
		Percent (%)	7.143	10.714	17.857
	7	Frequency count	2	0	2
		Percent (%)	7.143	0.000	7.143
	8	Frequency count	1	0	1
		Percent (%)	3.571	0.000	3.571
	9	Frequency count	1	0	1
		Percent (%)	3.571	0.000	3.571

that both smokers and non-smokers were aware of the risk associated with smoking, but this awareness did not influence 58.3% of them to prevent or stop smoking [27]. Another study also showed that health students were aware of the health risks associated with tobacco use, although their knowledge of the health risk was not enough to dissuade them from smoking [28]. A study carried out among working-age people in the Ga-Rankuwa community in 2008 revealed that among its participants, 60% were knowledgeable about and aware of the inherent risks of smoking for cardiovascular disease [29].

Among those who consumed alcohol, those who drank 5 units of light alcohol had a higher knowledge of cardiovascular risk factors while those who drank four units of alcohol had higher awareness of cardiovascular risk factors than those who drank less or did not drink at all. Contrarily to the outcome of this research, a study carried out in 2006 reported that out of all the correspondents that participated, only 16% were able to identify alcohol as a major risk factor for stroke [30]. The reason for the difference in knowledge levels may not be because there is limited information on the effects of alcohol on cardiovascular health or that participants of our study have a higher knowledge level, but that alcohol has wider acceptability and use worldwide. What people may not know is what quantity of alcohol intake constitutes cardiovascular risk. Although there is limited literature on the knowledge and awareness of alcohol with regard to CVDs, a study has reported that most of the burden associated with alcohol use stems from regular heavier drinking; affirming that the effect of alcohol consumption on hypertension is almost entirely detrimental with the risk increasing as the consumption increases [31].

This study supported the assertion that an increasing level of knowledge of CVD and its risks comes with an increased level of education. Those who had a Ph.D. had the highest level of knowledge on cardiovascular disease risk factors while the knowledge steadily decreased in lower education levels with secondary education having the lowest level of knowledge [32]. This could be attributed to the fact that those with higher educational levels have a higher knowledge of cardiovascular risk factors as a result of increased exposure to information and a better understanding of how to prevent or control these risk factors. Participants who had a master's had a higher level of awareness followed by those with secondary education, Ph.D., and Bachelor's degree having the lowest level of awareness. This also concurred with results from studies that showed that lower educational levels increased cardiovascular risk factors among participants of their study and respondents with a higher level of education generally have better lifestyles and adherence to treatment [33, 34]. Yuqiu and Wright, however, reported no clear trend was determined between the risk factors investigated with regard to educational level, but there was a positive trend between age and awareness [29].

The average BMI and waist circumference values reflected a generally overweight population when compared to the normal BMI value of the national heart, lung, and blood institute. Approximately equal numbers of males and females were overweight and the same number were obese. This agrees with the results gotten from a Malaysian study which also had equal percentages of male and female overweight participants in their study [35]. This study revealed that 34.7% of the participants had a waist-to-hip ratio that put them at moderate to high risk of cardiovascular diseases and a greater part of this percentage was made up of females which corresponded with the aforementioned Malaysian study reporting a higher prevalence of abdominal obesity among female respondents [35].

The mean values of the diastolic and systolic blood pressures gotten in this study conformed to the WHO standards for diastolic and systolic blood pressures and conforms to the results of a similar study showing that the average value of SBP and DBP (78.80 and 116.71, respectively) were relatively normal among the participants [36]. Among those with elevated blood pressure (SBP 5.7%; DBP 12.9%) in our study, males had a higher percentage of hypertensive participants. This also correlates with the results gotten from a study where approximately 75% of males were hypertensive (p <0.001) [37]. Males also had a higher percentage of diastolic pre-hypertensive participants while the systolic pre-hypertensive count was relatively equal, thus further emphasizing the higher tendency of males to acquire diastolic hypertension. This difference was explained by Maranon and Reckelhoff [38] as a result of differences in androgen secretion in males and females.

Findings from this study revealed that the majority of the participants were involved in a moderately active lifestyle and this could be attributed to their increased knowledge level. This is in line with a study that reported academic staff have a high perception that physical activity enhances the quality of life and knowledge about the usefulness of physical activity in promoting good health [39]. A study carried out in Udupi district Karnataka recorded a larger percentage (85.9%) of the participants were moderately to vigorously active [40]. The tendency to engage in physical activity was higher among males than in females and this is supported by a couple of studies [41, 42]. This disparity between gender and physical activity could be attributed to the fact that males are generally stronger and abler at accomplishing higher-intensity physical activity than females [43].

The majority of the participants were moderately active comprising more than 50% of the participants. Different studies state that there is an inverse relationship between PA and BMI, i.e., as physical activity increases the value of BMI decreases, leading to an increase in muscle mass and a decrease in fat mass [44], and participants who were physically active at high levels, had a higher rate of overweight/obese than underweight and normal BMI and this was associated to their misperception of body image [45]. Although in contrast, a previous study reported that underweight, overweight, and obese participants had poorer performance in the physical activity index than normal-weight participants. This difference from our results may be due to environmental or lifestyle factors [46].

Implication of findings

The implication of this study revolves around the need for the staff of the university to improve their risk scores by practicing health-promoting behaviors like increased physical activity, blood pressure control, and smoking cessation. This entails that without deliberate efforts to promote health behaviors people can slide into health challenges that are associated with modifiable risk factors. The findings have challenged stakeholders in the health industry to redouble their efforts in their various areas of practice to improve awareness creation among the populace to lessen the risk factors that bring about health issues. We will go back to the population to create awareness of health-enhancing behaviors as a way of appreciating them for participating in the current study. This, we believe, will help in strengthening their resolve to adopt health behavior strategies that will help them stay healthy. Also, awareness creation in the area of knowing the risk associated with a lack of awareness of CVD risk factors should be prioritized by the authors during the dissemination of the study outcome to the study population.

Limitation of study

The research design used in this study was a cross-sectional survey which may not guarantee the authenticity of the participant's responses. Also, the small sample size may hinder the generalization of the outcome. Based on the two limitations the outcome should be interpreted with caution.

Abbreviations

LMICS	Low- and middle-income countries
CVD	Cardiovascular disease
SSA	Sub-Saharan Africa
HRQoL	Health-related quality of life
BP	Blood pressure
PA	Physical activity
BMI	Body mass index
NCD	Non-communicable disease
CARRF-KL	Cardiovascular Disease Risk Factors Knowledge Level
CRF	Cardiovascular risk factor
SBP	Systolic blood pressure
DBP	Diastolic blood pressure
WHO	World Health Organization
IPAQ-SF	International Physical Activity Questionnaire Short-Form
ISMAQ	International Stress Management Association Questionnaire
METS	Metabolic equivalents
IBM	International business machine

SPSS Statistical Package of Social Sciences
WASSEC West Africa Senior School Certificate
HIV Human immunodeficiency virus
AIDS Acquired immunodeficiency syndrome
Ph. D Doctor of philosophy

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Authors' contributions
UMC, FO, UPO, AA, ACA, IUO, and CNO made substantial contributions to the conceptualization and design of the study, data collection, analysis and interpretation, manuscript writing, and editing. UMC and UPO were involved in the manuscript revision and editing. The authors read and approved the final manuscript.

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Availability of data and materials
The data is with the corresponding author and will be made available at a reasonable request.

Declarations

Ethics approval and consent to participate
Ethics approval to carry out the research was obtained from the Institutional Ethics Committee of the Faculty of Health Sciences and Technology, Nnamdi Azikiwe University, Awka (/NAU/FHST/2022/MRH24). All participants signed a written informed consent form to participate in the study.

Consent for publication
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Competing interests
The authors declare that they have no competing interests.

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