

Assessment of Non-Communicable Disease Risk Factors Among Staff of the University for Development Studies, Tamale Campus, Using the WHO STEPwise Approach

Micaiah Asefua Mensah

mensahmicaiah05@gmail.com

University for Development Studies

Research Article

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Abstract

Background

Non-communicable diseases (NCDs) are increasingly important public health concerns in sub-Saharan Africa, with behavioural, physical, and metabolic risk factors contributing to their growing burden. University staff may be exposed to several of these risk factors because of sedentary work patterns, occupational demands, and lifestyle behaviours. This study assessed selected behavioural, physical, and biochemical risk factors for NCDs among staff of the University for Development Studies (UDS), Tamale Campus, Ghana.

Methods

An analytical cross-sectional study was conducted among 374 teaching and non-teaching staff at UDS, Tamale Campus. Data were collected using a structured questionnaire administered through Kobocollect. Behavioural factors included tobacco use, alcohol consumption, and dietary salt practices. Physical measurements included body mass index (BMI), waist circumference, and blood pressure, while random blood glucose was assessed as a biochemical indicator. Descriptive statistics were used to summarize the data, while chi-square tests assessed associations between behavioural factors and NCD-related outcomes. Statistical significance was set at $p < 0.05$.

Results

The majority of participants were aged 31–41 years (37.4%), with a mean age of 38.56 ± 10.63 years. Males constituted 55.9% while 70.3% were non-teaching staff. Current tobacco smoking was reported by 1.1% of participants, while 13.9% reported consuming alcohol within the past 12 months. Regarding dietary salt practices, 44.1% reported never adding salt to food before eating. Overweight and obesity were observed in 34.0% and 24.1% of participants, respectively, resulting in 58.1% having excess body weight. High-risk waist circumference was observed in 60.0% of female staff and 19.1% of male staff. Raised blood pressure was observed in 6.7% of participants. Regarding blood glucose status, 19% were classified as being at risk of diabetes and 3% were diabetic. Tobacco smoking and alcohol consumption were significantly associated with blood pressure status ($p = 0.001$ and $p < 0.001$, respectively). Similarly, both tobacco smoking ($p = 0.018$) and alcohol consumption ($p = 0.031$) were significantly associated with blood glucose status.

Conclusion

Metabolic risk factors, particularly overweight, obesity, abdominal obesity, and abnormal blood glucose, were prominent among university staff. Workplace-based interventions incorporating regular NCD

screening, healthy dietary practices, physical activity, and weight-management strategies are recommended.

Introduction

Non-communicable diseases (NCDs) are a major global public health concern and include cardiovascular diseases, diabetes, chronic respiratory diseases, and cancers. Unlike infectious diseases, NCDs often develop gradually and are largely influenced by modifiable behavioural and metabolic risk factors, including unhealthy diets, physical inactivity, tobacco use, harmful alcohol consumption, obesity, raised blood pressure, and elevated blood glucose (Compendium, 2021). Globally, NCDs account for approximately 43 million deaths annually, representing about 75% of all deaths worldwide (World Health Organization [WHO], 2025). The burden of these diseases continues to increase, with an estimated 537 million adults aged 20–79 years living with diabetes and more than 1.9 billion adults classified as overweight, including over 650 million living with obesity (WHO, 2023). These trends demonstrate the increasing importance of identifying and addressing NCD risk factors before they progress to established chronic disease.

The burden of NCDs is also increasing in low- and middle-income countries, including those in Africa. Rapid urbanization, industrialization, technological advancement, and changes in lifestyle have contributed to increased exposure to unhealthy diets and sedentary behaviours (Garin et al., 2019). In sub-Saharan Africa, NCDs coexist with infectious diseases, creating a double burden that places considerable pressure on already constrained health systems (Compendium, 2021). In West Africa, hypertension prevalence has been reported to range between 25% and 40%, with changing dietary patterns, urbanization, and sedentary lifestyles identified as important contributing factors (Kabwama et al., 2019). In Ghana, hypertension prevalence among adults has been estimated at approximately 25%–30%, while NCDs continue to contribute substantially to the country's overall disease burden (Amon et al., 2024; Compendium, 2021).

Northern Ghana is similarly experiencing an increasing burden of NCDs. In the Tamale Metropolis, hypertension, diabetes, and other chronic conditions have become important public health concerns, with increasing risks of both acute and long-term complications (Abagre et al., 2022). Evidence from occupational groups in Ghana also indicates considerable exposure to NCD risk factors. Studies among teachers have reported high levels of physical inactivity and other health risks, with more than two-thirds of participants being overweight or obese and several NCD risk factors occurring simultaneously (Ansah et al., 2023; Ogunyemi et al., 2023). These findings suggest that working adults may be particularly vulnerable to NCDs because of occupational demands, sedentary behaviours, unhealthy dietary practices, and limited opportunities for preventive health screening.

University staff represent an important occupational population that may be exposed to multiple NCD risk factors. Teaching staff may experience long working hours, high workloads, prolonged sitting, research responsibilities, and psychological stress, while non-teaching staff may also experience

sedentary work, irregular eating patterns, and limited opportunities for routine health screening. High workloads and work-related demands can affect employee well-being and productivity (Bakker & Demerouti, 2018). Furthermore, evidence from university-based populations indicates that employees may have multiple risk factors, including physical inactivity, inadequate fruit and vegetable consumption, dyslipidemia, and hypertension (Reddy & Naidoo, 2018). Despite these concerns, limited evidence is available on the combined behavioural, physical, and biochemical NCD risk factors among university staff in Northern Ghana.

Early identification of NCD risk factors is essential because individuals may have elevated blood pressure, abnormal blood glucose, or excess body weight without experiencing obvious symptoms. The WHO STEPwise approach to NCD risk-factor surveillance provides a standardized and practical framework for assessing these risks. The approach collects information on key behavioural risk factors, including tobacco use, alcohol consumption, diet, together with physical measurements such as body weight, height, waist circumference, and blood pressure, and biochemical measurements such as blood glucose (Reddy & Naidoo, 2018). Its standardized nature allows risk factors to be systematically assessed and compared across populations and settings.

Assessing NCD risk among staff of the University for Development Studies, Tamale Campus, is therefore important for generating context-specific evidence on the health of an occupational group that contributes directly to the university's teaching, research, administrative, and support functions. Identifying the prevalence and distribution of behavioural, physical, and biochemical risk factors can provide evidence for early intervention and inform workplace health-promotion strategies. However, there is limited information on the extent to which these risk factors occur among university staff in the Tamale setting. This study therefore assessed chronic disease risk among staff of the University for Development Studies, Tamale Campus, using the WHO STEPwise approach, with particular emphasis on behavioural risk factors, physical risk indicators, biochemical markers, and their associations

Methods

Study setting

The study was conducted at the Tamale Campus of the University for Development Studies (UDS), located in Tamale in the Northern Region of Ghana. The university operates a multi-campus system, with major campuses in Tamale, Nyankpala, and Yendi.

The Tamale Campus is one of the major academic and administrative centres of the university and hosts teaching, research, administrative, and other support activities. The university has a diverse workforce comprising teaching and non-teaching staff who perform various academic, administrative, technical, security, and support functions. The diverse occupational groups and work environments at the Tamale Campus provided an appropriate setting for assessing behavioural, physical, and biochemical risk factors for non-communicable diseases among university staff.

Study design

An analytical cross-sectional study design with a quantitative approach was employed. The design enabled the assessment of behavioural, physical, and biochemical risk factors for non-communicable diseases and their associations among staff at a specific period.

Study population

The study population comprised teaching and non-teaching staff working at the UDS Tamale Campus. Teaching staff included lecturers, researchers, and academic administrators, while non-teaching staff included administrative staff, secretaries, cleaners, drivers, technicians, security personnel, and other support staff.

Inclusion criteria

Staff members were eligible to participate if they were aged 18 years or older, worked at the UDS Tamale Campus, and provided informed consent to participate in the study.

Exclusion criteria

Staff members who were seriously ill during the data collection period were excluded. Pregnant women were also excluded because pregnancy-related changes in body weight and body composition may affect the interpretation of body mass index and waist circumference measurements. Lactating women were excluded because physiological and hormonal changes during lactation may influence some of the measurements assessed in the study.

Sample size determination

The sample size was determined using Cochran's formula: $n = Z^2 p(1 - p) / e^2$, where n is the required sample size, Z is the standard normal deviate corresponding to a 95% confidence level (1.96), p is the estimated prevalence of non-communicable disease risk factors (67%) among teaching and non-teaching staff in Northern Ghana (Abubakar et al., 2023), and e is the margin of error (5%).

Using $Z = 1.96$, $p = 0.67$, and $e = 0.05$, the calculated sample size was approximately 340 participants. A 10% allowance for non-response was added to account for incomplete questionnaires and non-participation, resulting in a final minimum sample size of 374 staff members.

Sampling technique

A convenience sampling technique was used to recruit participants. The researcher visited offices and work locations across the Tamale Campus and approached eligible teaching and non-teaching staff. The purpose and procedures of the study were explained to potential participants, and those who voluntarily consented to participate were recruited. Recruitment continued across the campus until the required sample size was achieved

Data collection methods

Data were collected using a structured questionnaire administered electronically through Kobocollect. The questionnaire was adapted from the World Health Organization (WHO) STEPwise Approach to Non-Communicable Disease Risk Factor Surveillance (STEPS) Instrument and modified to suit the objectives and context of the present study. The STEPS instrument is a standardized tool designed to collect information on behavioural, physical, and biochemical risk factors for non-communicable diseases, anthropometric measurements, blood pressure, and blood glucose levels (WHO, 2024). The questionnaire collected information on socio-demographic characteristics including age, sex, religion, ethnicity, marital status, and employment category and income level. Behavioural risk factors, included tobacco use, alcohol consumption, dietary salt consumption, physical measurements included weight, height, Body Mass Index (BMI), and waist circumference. Clinical and biochemical assessments included blood pressure and random blood glucose levels. All measurements were conducted using standardized procedures, and appropriate equipment was used for each measurement.

Weight and height measurements

Body weight was measured using a calibrated digital weighing scale (Seca 761). The scale was placed on a firm, level surface and checked for zero balance before each measurement. Participants were asked to remove their shoes and heavy clothing and to empty their pockets before measurement. Each participant stood upright at the centre of the scale with their arms relaxed at their sides. Weight was recorded to the nearest 0.1 kg.

Height was measured using a stadiometer. Participants were asked to remove their shoes, head coverings, and hair accessories that could interfere with the measurement. They stood upright with their feet together and heels positioned against the vertical board. The head was positioned in the Frankfurt horizontal plane, and the headpiece was lowered gently onto the crown of the head. Height was recorded to the nearest 0.1 cm.

Body mass index was calculated as weight in kilograms divided by height in meters squared (kg/m^2). BMI was classified as underweight ($< 18.5 \text{ kg/m}^2$), normal weight ($18.5\text{--}24.9 \text{ kg/m}^2$), overweight ($25.0\text{--}29.9 \text{ kg/m}^2$), and obese ($\geq 30.0 \text{ kg/m}^2$) (WHO, 2023).

Waist circumference measurement

Waist circumference was measured using a flexible, non-stretch measuring tape. Participants stood upright with their feet together and arms relaxed at their sides. The tape was positioned horizontally at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest. The measurement was taken at the end of a normal expiration, ensuring that the tape was snug without compressing the skin. Waist circumference was recorded to the nearest 0.1 cm.

Waist circumference was classified according to sex. For females, < 80 cm was considered normal, 80–87.9 cm indicated increased risk, and ≥ 88 cm indicated high risk. For males, < 94 cm was considered normal, 94–101.9 cm indicated increased risk, and ≥ 102 cm indicated high risk (WHO, 2023).

Random blood glucose measurement

Random blood glucose was measured using an *On Call Extra* glucometer. The procedure was conducted using standard infection-prevention precautions. The participant's fingertip was cleaned with an alcohol swab and allowed to air dry. A sterile disposable lancet was used to prick the side of the fingertip. The first drop of blood was wiped away, and the second drop was applied to a test strip inserted into the glucometer. The blood glucose level displayed by the glucometer was recorded in mmol/L. A new sterile lancet and test strip were used for each participant to prevent cross-contamination. The glucometer was checked and operated according to the manufacturer's instructions. The results were categorized as hypoglycemia (< 3.8 mmol/L), normal (3.9–7.8 mmol/L), prediabetes (impaired glucose) (7.9–11.0 mmol/L) and diabetes (> 11.1 mmol/L) (WHO, 2025).

Blood pressure measurement

Blood pressure was measured using an *Omron* digital sphygmomanometer. Participants were asked to sit quietly and rest for at least 15 minutes before measurement. The cuff was appropriately positioned around the upper arm while the participant was seated comfortably. Two measurements were taken approximately three minutes apart, and the systolic and diastolic blood pressure readings were recorded in mmHg. The mean of the two readings was used for analysis. Blood pressure was categorized according to standard classifications as less than or equal to 139/89 as normal blood pressure and greater than or equal to 140/90 as raised blood pressure (WHO, 2025)

Data analysis

Data collected through Kobocollect were exported to Microsoft Excel for cleaning, coding, and verification before being imported into IBM Statistical Package for the Social Sciences for statistical analysis. Descriptive statistics, including frequencies and percentages, were used to summarize categorical variables such as socio-demographic characteristics, behavioural risk factors, and categories of physical and biochemical measurements. Means and standard deviations were used to summarize continuous variables, including participants' age and average income

The chi-square test of independence was used to examine associations between categorical behavioural risk factors and NCD-related physical and biochemical outcomes. Statistical significance was determined at a p -value of < 0.05.

Results

Socio-demographic information of the participants

The majority of the staff were within the age group of 31–41 years (37.4%), with a mean age of 38.56 ± 10.63 years. The majority were males (55.9%). Most of the staff practice Islam (55.9%). The Dagomba ethnic group was the most represented (31.3%). More than half of the staff were married (55.9%). Regarding employment status, non-teaching staff formed the largest group (70.3%). The average income of the staff was 4076 Ghana cedis (approximately US\$355) (Table 1).

Table 1
Socio-demographic information of the participants

Variable	Frequency	Percentage(%)
Age group (years)		
<i>Mean ± SD</i>	<i>38.56 ± 10.626</i>	
20–30	103	27.6
31–41	139	37.4
42–52	79	21.1
53+	52	13.9
Gender		
Female	165	44.1
Male	209	55.9
Religion		
Christianity	164	43.9
Islam	209	55.9
Traditional	1	0.2
Ethnicity		
Dagomba	117	31.3
Mamprusi	47	12.6
Talensi	11	2.9
Frafra	57	15.2
Gonja	42	11.2
Ashanti	37	9.9
Others	63	16.8
Marital status		
Never married	111	29.7
Married	209	55.9
Divorced	28	7.5
Widowed	26	7.0

Variable	Frequency	Percentage(%)
Age group (years)		
Employment category		
Teaching staff	111	29.7
Non-teaching staff	263	70.3
Average income (₹)		
<i>Mean</i>	4076	

Behavioural factors of the respondents

Tobacco use among the participants

Only 1.1% of the staff currently smoked tobacco products, and 1.1% reported smoking tobacco products daily. Among the four current smokers, two (50.0%) had attempted to stop smoking within the past 12 months. Regarding smokeless tobacco, 0.5% reported current use, while 1.6% had ever used smokeless tobacco products. Additionally, 0.5% reported using other forms of smokeless tobacco, such as snuff and betel (Table 2).

Table 2
Tobacco use among the participants

Variable	Frequency	Percentage(%)
Currently smoking tobacco products		
Yes	4	1.1
No	370	98.9
Currently smoke tobacco products daily		
Yes	4	1.1
No	370	98.9
The past 12 months, have you tried to stop smoking		
Yes	2	50
No	2	50
Ever smoke tobacco products		
Yes	7	1.9
No	367	98.1
Currently use any smokeless tobacco products		
Yes	2	0.5
No	372	99.5
Use any other smokeless tobacco		
Yes	2	0.5
No	372	99.5
Ever use smokeless tobacco products		
Yes	6	1.6
No	368	98.4

Alcohol consumption among the participants

The majority of the staff had never consumed alcohol, with 307 (82.1%) reporting that they had never consumed alcohol. Among the 67 staff who had ever consumed alcohol, 52 (77.6%) reported consuming alcohol within the past 12 months, while 15 (22.4%) reported that they had not consumed alcohol during the same period. Similarly, 52 (77.6%) of those who had ever consumed alcohol reported consuming untaxed alcohol, whereas 15 (22.4%) reported that they did not consume untaxed alcohol (Table 3).

Table 3
Alcohol consumption among the participants

Variable	Frequency	Percentage(%)
Ever consumed any alcohol		
Yes	67	17.9
No	307	82.1
Consumed any alcohol within the past 12 months		
Yes	52	77.6
No	15	22.4
Consume any untaxed alcohol		
Yes	52	77.6
No	15	22.4

Dietary salt consumption among the participants

The findings indicated that 44.1% of the staff reported never adding salt to their food before eating, while 1.6% did not know whether they added salt to their food or not. Regarding the consumption of processed foods high in salt, 33.4% reported that they sometimes consumed such foods (Table 4).

Table 4
Dietary salt salt consumption among the participants

Variables	Frequency	Percentages(%)
Add salt to your food before eating it		
Always	23	6.1
Don't know	6	1.6
Never	165	44.1
Often	45	12.0
Rarely	69	18.4
Sometimes	66	17.6
Eat processed food high in salt		
Always	8	2.1
Don't know	5	1.3
Never	90	24.1
Often	52	13.9
Rarely	94	25.1
Sometimes	125	33.4

Physical risk factors

Body Mass Index status of the participants

The largest proportion of staff had normal weight (39.0%), followed by those who were overweight (34.0%) and obese (24.1%). Only 2.9% were underweight (Table 5)

Table 5
Body Mass Index status of the participants

BMI category	Frequency	Percentages(%)
Underweight	11	2.9
Normal weight	146	39.0
Overweight	127	34.0
Obese	90	24.1

Waist circumference of the participants

A higher proportion of female staff were categorized as having high-risk waist circumference compared with male staff (60.0% vs. 19.1%). Among male staff, 62.2% had normal waist circumference compared with 14.5% of female staff, indicating lower central obesity among men (Table 6)

Table 6
Waist circumference of the participants

Variable	Abdominal obesity status			Total
Gender	Normal	Increased Risk	High Risk	
	N (%)	N (%)	N (%)	
Female	24 (14.5)	42 (25.5)	99 (60.0)	165 (100)
Male	130 (62.2)	39 (18.7)	40 (19.1)	209 (100)

Blood pressure status of the participants

The majority of the staff had normal blood pressure, representing 93.3%, while 6.7% were found to have raised blood pressure (Table 7)

Table 7
Blood pressure status of the participants

Blood pressure category	Frequency	Percentages(%)
Normal blood pressure	349	93.3
Raised blood pressure	25	6.7

Biochemical markers

Random blood sugar level of the participants

Most of the staff had normal blood glucose levels (71%), while 19% were at risk of developing diabetes and 7% had low blood glucose levels. Only 3% were diabetic. Overall, 22% of the staff were either pre-diabetic or diabetic (Fig. 1).

Associations between behavioral risk factors and NCD outcomes

Association between behavioural risk factors and blood pressure status

A significant association was found between smoking of tobacco, alcohol consumption and blood pressure status ($p = 0.001$) and ($p < 0.001$) respectively (Table 8).

Table 8
Association between behavioural risk factors and blood pressure status

Variable	Blood pressure status		P-value
	Normal blood pressure	Raised blood pressure	
	N (%)	N (%)	
Smoking of tobacco			
Yes	3 (75.0)	1 (25.0)	0.001
No	345 (93.5)	24 (6.5)	
Alcohol consumption			
Yes	56 (83.6)	11 (16.4)	< 0.001
No	292 (95.4)	14 (4.6)	

Association between behavioral risk factors and biochemical indicator

The findings showed that tobacco smoking ($p = 0.018$) and alcohol consumption ($p = 0.031$) were significantly associated with blood glucose levels (**Table 9**).

Table 8
Association between behavioural risk factors and blood glucose level

Variable	Blood glucose level		P-value
	Normal blood glucose	High blood glucose	
	N (%)	N (%)	
Smoking of tobacco			
Yes	3 (75.0)	1 (25.0)	0.018
No	68 (91.9)	6 (8.1)	
Alcohol consumption			
Yes	53 (84.1)	10 (15.9)	0.031
No	18 (94.7)	1 (5.3)	

Discussion

This study assessed selected behavioural, physical, and biochemical risk factors for non-communicable diseases (NCDs) among university staff. The findings showed low levels of tobacco and alcohol use, while excess body weight, high-risk waist circumference, and abnormal blood glucose categories were observed among the participants. These findings indicate the presence of several NCD-related risk factors among university staff.

The prevalence of current tobacco smoking was low (1.1%), and the same proportion reported smoking tobacco products daily. Only 1.9% had ever smoked tobacco products, while current and ever use of smokeless tobacco were 0.5% and 1.6%, respectively. Among the four current smokers, two (50.0%) reported attempting to stop smoking within the previous 12 months. These estimates were lower than findings reported among adults in other African settings. In Ghana, Sharma et al. (2017) reported that approximately 6% of adults had a history of tobacco use, while Pengpid and Peltzer (2023) reported tobacco use prevalence ranging from 9.9% to 11.9% among adults in Cabo Verde. Differences in study population, occupational setting, educational characteristics, and social norms may partly explain these variations. Despite the low prevalence observed, tobacco use remains relevant because it is an established modifiable risk factor for cardiovascular disease, respiratory disease, and several cancers (Agyekum et al., 2024).

Alcohol consumption was also relatively low. Overall, 17.9% of staff reported ever consuming alcohol, while 13.9% reported consuming alcohol within the previous 12 months. Among those who had ever consumed alcohol, 77.6% reported consuming alcohol within the previous 12 months. This was lower than the prevalence reported among working-age adults in Ghana, where approximately 26% were reported to consume alcohol regularly (Pengpid & Peltzer, 2023), and among adults in Uganda, where alcohol consumption was estimated at 31.2% (Kabwama et al., 2019). Differences in study populations, definitions of alcohol use, and cultural and occupational characteristics may partly explain these differences. Although alcohol use was relatively uncommon in the present study, excessive alcohol consumption is associated with several NCDs, including hypertension, cardiovascular disease, and diabetes (Kabwama et al., 2019).

Dietary salt-related practices showed that 44.1% of staff reported never adding salt to their food before eating. However, some participants reported consuming processed foods high in salt, with 33.4% sometimes, 13.9% often, and 2.1% always consuming such foods. This finding shows that not adding salt at the table does not necessarily indicate low exposure to dietary sodium, as processed foods may also contribute to salt intake. Previous evidence from Tamale has reported unhealthy dietary practices among adults, including low fruit and vegetable consumption and increased consumption of processed foods (Abubakar et al., 2023). Dietary health promotion among university staff could therefore address both discretionary salt use and the frequency of consuming processed and commercially prepared foods.

Excess body weight was common among the participants. Although 39.0% of staff had normal weight, 34.0% were overweight and 24.1% were obese. Thus, 58.1% of the staff were classified as either

overweight or obese. This prevalence was higher than the 33.6% reported among university staff in Tamale by Abubakar et al. (2023). Differences in study population, age structure, measurement procedures, and timing of data collection may partly explain the variation. The observed prevalence is relevant because overweight and obesity are established risk factors for conditions such as hypertension, type 2 diabetes, and cardiovascular disease. The finding is also consistent with evidence indicating an increasing prevalence of overweight and obesity among African working populations in the context of urbanization, dietary changes, sedentary occupations, and reduced physical activity (Atibila et al., 2021).

Differences in waist circumference were observed between male and female staff. High-risk waist circumference was recorded among 60.0% of female staff compared with 19.1% of male staff. Conversely, 62.2% of male staff had normal waist circumference compared with 14.5% of female staff. This finding is consistent with previous evidence showing a higher prevalence of central obesity among women (Noubiap et al., 2019). Differences in body fat distribution and other biological, behavioural, and sociocultural factors may contribute to variations in abdominal obesity between men and women. Central adiposity is associated with metabolic risk factors such as insulin resistance, hypertension, and type 2 diabetes and may provide additional information beyond BMI. Mwin et al. (2025) similarly reported an association between abdominal fat accumulation and increased blood pressure risk, including among individuals with normal BMI.

Most staff had normal blood pressure (93.3%), while 6.7% had raised blood pressure. This prevalence was lower than estimates reported among working adults in previous studies. Atibila et al. (2021) reported high blood pressure prevalence ranging from 27% to 48% among working adults, while Bosu and Bosu (2021) reported a prevalence of 29.3% among public servants in the Ejisu-Juaben Municipality of Ghana. Differences in participant characteristics, age distribution, measurement procedures, and study settings may partly explain these differences. Although most participants had normal blood pressure, the presence of raised blood pressure among some staff indicates that blood pressure screening remains relevant in this population.

Regarding blood glucose, 71% of staff had normal blood glucose levels, while 19% were classified as being at risk of diabetes, 7% had low blood glucose levels, and 3% were classified as diabetic according to the categories used in the study. The proportion classified as diabetic was comparable to the 2.6% reported in a systematic review of adults in Nigeria (Atibila et al., 2021) and was within the range reported in previous Ghanaian studies (Abagre et al., 2022). The observed blood glucose findings are relevant given the prevalence of overweight and obesity in the study population. However, the cross-sectional nature of the study does not allow a temporal relationship between body weight and blood glucose status to be established.

The findings are consistent with evidence of an increasing burden of diabetes and other metabolic risk factors in sub-Saharan Africa, where urbanization, dietary changes, obesity, and physical inactivity have been identified as contributing factors (Abagre et al., 2022). However, the present study used random

blood glucose measurements. Therefore, the findings should be interpreted as an indication of the blood glucose categories observed in the study rather than as definitive clinical diagnoses of prediabetes or diabetes. Confirmatory testing using appropriate diagnostic methods would be required to establish these conditions clinically.

The study also identified significant associations between tobacco smoking and blood pressure status ($p = 0.001$) and between alcohol consumption and blood pressure status ($p < 0.001$). Similarly, tobacco smoking ($p = 0.018$) and alcohol consumption ($p = 0.031$) were significantly associated with blood glucose status. In addition, the cross-sectional design does not establish causal relationships between the behavioural factors and the observed health outcomes.

Taken together, the findings indicate that the principal NCD risk burden among the university staff was related more strongly to excess body weight, abdominal obesity, and abnormal glucose status than to tobacco and alcohol use. The coexistence of these metabolic risk factors suggests a need for comprehensive workplace-based NCD prevention strategies that promote healthy dietary practices, weight management, and regular screening for hypertension and abnormal blood glucose. Such interventions may be particularly important for female staff, given the substantially higher prevalence of high-risk abdominal obesity observed in this group.

Novelty of the study

The novelty of this study lies in its assessment of behavioural, physical, and biochemical risk factors for non-communicable diseases among university staff within a single study population. While previous studies in Ghana have examined individual NCD risk factors, limited evidence has simultaneously examined tobacco and alcohol use, dietary salt practices, body weight, abdominal obesity, blood pressure, and blood glucose among university staff in the study setting. The study therefore provides a comprehensive assessment of the current NCD risk profile of university staff and highlights excess body weight, abdominal obesity, and abnormal blood glucose as important areas requiring attention. The findings also provide context-specific evidence that can inform workplace health promotion and NCD prevention programs in university settings.

Practical implications

The findings have important implications for workplace health promotion and NCD prevention. The high prevalence of overweight and obesity and the substantial proportion of staff with high-risk waist circumference indicate a need for interventions that address weight management and physical inactivity. Regular workplace screening for BMI, waist circumference, blood pressure, and blood glucose could support early identification of staff at increased risk of NCDs. In addition, workplace nutrition programs should promote healthier food choices and discourage frequent consumption of processed and high-salt foods. Universities could also incorporate physical activity opportunities, active breaks, walking

programs, and health education into staff wellness initiatives. These measures could provide a practical and sustainable approach to reducing NCD risk among university employees.

Conclusion

The study found low levels of tobacco and alcohol use among university staff, while excess body weight and central obesity were commonly observed. More than half of the staff were overweight or obese, and high-risk waist circumference was more common among female staff. Although most participants had normal blood pressure, some had raised blood pressure. Abnormal blood glucose levels were also observed, including participants classified as being at risk of diabetes or as diabetic. These findings highlight the presence of several modifiable NCD risk factors among university staff. Workplace health promotion activities focusing on healthy dietary practices, physical activity, and regular screening may support early identification and management of NCD risk factors among staff.

Declarations

Ethical standards disclosure

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical clearance was obtained from the Institutional Review Board of the University for Development Studies (UDS/RB/0047/26), and permission was obtained from the relevant school/faculty deans and heads of departments before data collection. Participation was entirely voluntary, and written informed consent was obtained from all participants prior to their involvement in the study. Participants were informed about the purpose and procedures of the study and were allowed to ask questions and seek clarification before providing consent.

Consent for publication

Not Applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing of interest

The author declares that there is no conflict of interest regarding the publication of this manuscript.

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Authors' contributions

Micaiah Asefua Mensah conceptualized the study, developed the methodology, collected and analyzed the data, and prepared the manuscript. The author read and approved the final manuscript.

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Figures

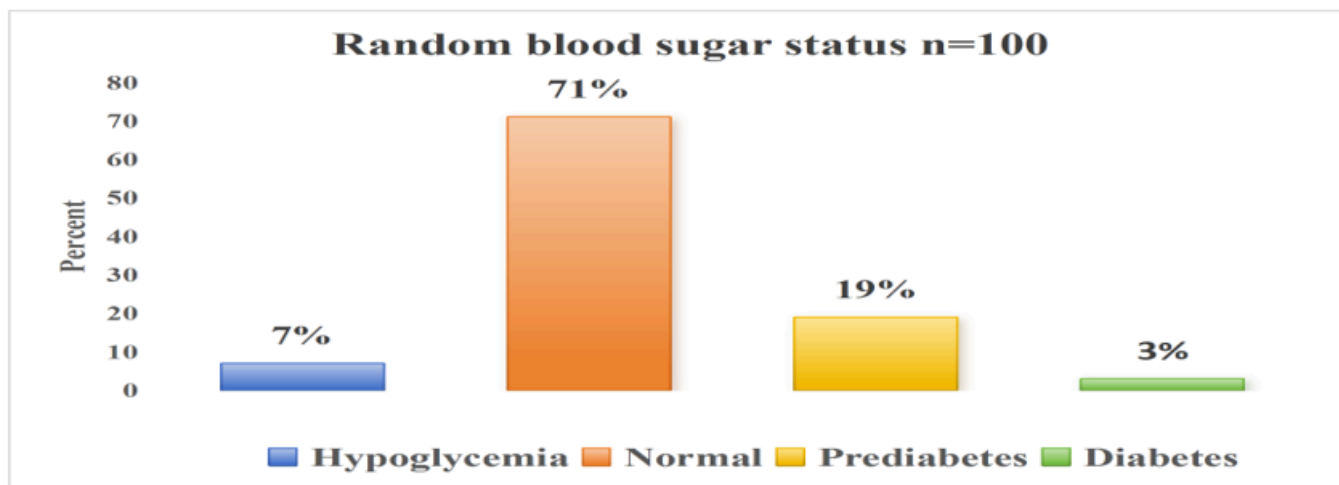


Figure 1

Distribution of blood glucose status among staff of UDS