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Hypertension and Associated Factors Among Employees of a Tertiary Academic–Healthcare Institution in Southwestern Uganda

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ABSTRACT

Background: Hypertension is a major modifiable risk factor for cardiovascular disease, yet data on blood pressure burden among institutional workforces in Uganda remain limited. We determined the prevalence of hypertension and identified associated factors among university and hospital employees in southwestern Uganda.

Methods: We conducted a cross-sectional study among employees of the Mbarara University of Science and Technology and Mbarara Regional Referral Hospital, selected through stratified random sampling. Sociodemographic, occupational, behavioural, anthropometric and blood pressure data were collected using structured questionnaires and standardised measurements. Blood pressure was classified using the 2017 American College of Cardiology/American Heart Association criteria. Stage 1 hypertension was defined as systolic blood pressure 130–139 mmHg or diastolic blood pressure 80–89 mmHg and Stage 2 hypertension as systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg. Modified Poisson regression with robust variance estimation was used to estimate adjusted prevalence ratios.

Results: Of 231 participants, the mean age was 41.1 ± 9.3 years and 139 (60.2%) were male. Measured hypertension was present in 64 participants, yielding a prevalence of 27.7% (95% CI: 22.3%–33.9%). Stage 1 and Stage 2 hypertension were observed in 37 (16.0%) and 27 (11.7%) participants, respectively. Among participants with measured hypertension, 47 (73.4%) reported no previous clinical diagnosis of hypertension. In the adjusted analysis, current alcohol consumption was associated with a higher prevalence of measured hypertension (aPR = 1.74; 95% CI: 1.08–2.78; $p = 0.022$). Low physical activity was also associated with a higher prevalence of measured hypertension compared with high physical activity (aPR = 2.08; 95% CI: 1.13–3.83; $p = 0.019$). Moderate physical activity (aPR = 1.30; 95% CI: 0.66–2.56; $p = 0.457$) compared with high physical activity and central obesity (aPR = 1.47; 95% CI: 0.90–2.40; $p = 0.126$) were not significantly associated with hypertension after adjustment.

Conclusion: More than one-quarter of surveyed employees had measured hypertension, and nearly three-quarters of these individuals reported no previous clinical diagnosis. Current alcohol consumption and low physical activity were independently associated with a higher prevalence of measured hypertension. Workplace programmes should strengthen routine blood pressure screening, communication of screening results, referral and follow-up pathways, targeted physical activity promotion and alcohol-risk reduction.

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1 | Introduction

Hypertension is the leading modifiable risk factor for cardiovascular disease (CVD), stroke, chronic kidney disease and premature mortality globally [1]. Despite advances in prevention and treatment, the burden continues to increase, with the number of affected adults increasing from approximately 1.28 billion in 2019 to more than 1.4 billion in 2024 [2]. Nearly three-quarters of individuals with hypertension reside in low- and middle-income countries (LMICs), where health systems often face persistent challenges in screening, treatment and long-term blood pressure control [1, 3]. Population ageing, rapid urbanisation, unhealthy dietary patterns, physical inactivity and increasing obesity prevalence continue to drive this trend [2]. Sub-Saharan Africa (SSA) has experienced some of the fastest increases in hypertension prevalence globally, with pooled estimates ranging from 20% to 40% across subregions [2, 4]. This growing burden places substantial pressure on health systems, which have historically focused on communicable diseases.

Although hypertension has been widely studied in community-based populations, workplace populations deserve specific attention. Adults spend a large proportion of their productive years in occupational settings, where work routines may influence physical activity, diet, stress, sleep, alcohol consumption and opportunities for preventive health screening [5, 6]. Academic and healthcare institutions are especially relevant because they encompass a wide range of occupational roles, including sedentary administrative and teaching positions, as well as demanding clinical and professional responsibilities [7, 8]. These workplace exposures may interact with established cardiometabolic risk factors, such as obesity and harmful alcohol consumption, contributing to elevated blood pressure and the development of hypertension [9, 10]. In addition, institutional workplaces provide important opportunities for cardiovascular risk screening, health promotion and early intervention through workplace wellness programmes and routine health assessments [11, 12].

University and hospital employees are essential to the functioning of education and health systems, yet their cardiovascular health may receive limited institutional attention. Although such employees may have greater health literacy and better access to healthcare than the general population, demanding workloads, prolonged working hours, sedentary work patterns and competing professional responsibilities may reduce opportunities for regular physical activity and routine health screening [13, 14]. Hypertension in this workforce has implications beyond individual health, including absenteeism, reduced productivity, increased healthcare costs and potential disruption of essential academic and clinical services [15].

In Uganda, previous studies have documented a substantial burden of hypertension in both community and healthcare populations [16, 17]; however, evidence among institutional workforces remains scarce, particularly in settings where university and hospital employees operate within an integrated academic–healthcare environment. Generating such evidence is important for informing targeted workplace health interventions and may provide lessons for similar institutional settings across SSA, where health systems are increasingly challenged by the growing burden of noncommunicable diseases alongside persistent communicable diseases [18]. This study estimated the prevalence of hypertension and identified the associated factors among employees of a tertiary academic and healthcare institution in southwestern Uganda.

2 | Methods

2.1 | Study Design and Setting

This study was a secondary analysis of data from a primary institutional cross-sectional study conducted among employees of Mbarara University of Science and Technology and Mbarara Regional Referral Hospital between October 2025 and January 2026 [19]. The parent study assessed cardiometabolic risk profiles, metabolic syndrome prevalence and clustering of metabolic risk factors among academic, administrative and clinical personnel. The present analysis focused specifically on hypertension because the blood pressure threshold used to define metabolic syndrome differs from the threshold used to diagnose hypertension clinically. Accordingly, this analysis estimated hypertension prevalence using the 2017 American College of Cardiology/American Heart Association classification and examined factors associated with hypertension in this workforce.

2.2 | Study Population

The study population comprised employees of Mbarara University of Science and Technology and Mbarara Regional Referral Hospital. Employees were eligible if they were aged 18 years or older, had worked at either institution for at least six months and provided written informed consent. Pregnant women were excluded because pregnancy may influence blood pressure and anthropometric measurements.

2.3 | Sample Size and Sampling

The parent study sample size was calculated using the Kish–Leslie formula for cross-sectional studies, assuming a hypertension prevalence of 27.6% from a previous SSA study [20], 95% confidence level and 5% margin of error. After applying a finite population correction for an estimated workforce of 906 employees, the minimum sample size was 230 participants.

Participants were selected using stratified random sampling with proportional allocation by institution and job classification. Of the 239 employees selected from institutional personnel registers, eight were found to be ineligible and were excluded because they were pregnant ($n = 2$) or had been employed at the institution for less than six months ($n = 6$; Supporting Figure S1). The remaining 231 eligible participants completed the questionnaire and physical assessments and were included in the analysis. No eligible participant declined participation, and outcome data relevant to the study objectives were complete for all participants.

Because the sampling frame comprised institutional personnel registers and participants were selected before study contact, recruitment was less susceptible to volunteer bias than recruitment through walk-in screening services.

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2.4 | Data Collection and Measurements

Trained research assistants collected the data using structured interviewer-administered questionnaires and standardised physical measurements. The information obtained included sociodemographic characteristics (age, sex, marital status), occupational factors (institution, staff category and working hours) and behavioural factors (alcohol consumption and physical activity).

Physical activity was assessed using the core components of the International Physical Activity Questionnaire (IPAQ) and categorised as high, moderate and low activity for analysis [21].

Alcohol consumption was comprehensively evaluated using a structured recall questionnaire. Current alcohol consumption, the exposure used in the regression analyses, was defined as self-reported consumption of any alcoholic beverage during the 12 months preceding the survey. Participants reporting no alcohol consumption during this period were classified as noncurrent drinkers. For current drinkers, additional quantitative data were recorded, including duration of alcohol use (years), typical drinking frequency (days per week) and the typical number of standard drinks consumed per drinking occasion. One standard drink was defined as approximately 10 g of pure ethanol, equivalent to approximately 330 mL of regular beer, 120 mL of wine, or 30 mL of spirits. Only five participants reported consuming ≥ 5 drinks per occasion, constituting the heavy-drinking category. Given the small number of observations in this category, alcohol consumption was therefore analysed using a binary classification of current versus noncurrent drinking.

Weight, height, waist circumference and blood pressure were measured using standardised procedures. Body mass index (BMI) was calculated as weight (kg)/height (m^2) and classified according to World Health Organization criteria. Central obesity was defined using International Diabetes Federation cut-offs for SSA (waist circumference ≥ 94 cm in men and ≥ 80 cm in women) [22, 23].

Blood pressure was measured using a validated automated upper-arm digital monitor (Omron Healthcare, Kyoto, Japan) in accordance with standard clinical procedures. Before blood pressure measurement, mid-upper-arm circumference was measured at the midpoint between the acromion and olecranon processes. A large adult cuff with an arm circumference range of 32–42 cm was used because all enrolled participants had arm circumferences within this range. Cuff size was selected according to the manufacturer's recommended arm circumference range and standard blood pressure measurement guidance [24]. Participants were seated quietly for at least 5 min in a room before measurement, with the left arm supported at heart level. Two consecutive blood pressure measurements were obtained at 5-min intervals, and the arithmetic mean of the two readings was used for the analysis.

2.5 | Outcome and Independent Variables

The primary outcome was measured hypertension at study assessment, defined according to the 2017 American College of Cardiology/American Heart Association guidelines as a mean systolic blood pressure ≥ 130 mmHg or diastolic blood pressure ≥ 80 mmHg (encompassing Stage 1 [130–139/80–89 mmHg] and Stage 2 [$\geq 140/\geq 90$ mmHg] hypertension). Normal BP was defined as $< 120/< 80$ mmHg and elevated BP as 120–129/$<$ 80 mmHg. Self-reported prior clinical diagnosis and current antihypertensive medication use were evaluated descriptively to determine hypertension awareness and treatment rates.

Independent variables included age group (18–34, 35–49 and ≥ 50 years), sex, marital status, working hours (≤ 8 vs. > 8 h/day), alcohol consumption, physical activity level, BMI category and central obesity, which was measured using waist circumference.

2.6 | Data Management and Statistical Analysis

Data were entered, cleaned and analysed using Stata Version 17 (StataCorp, College Station, TX, USA). Continuous variables were summarised using means and standard deviations, while categorical variables were summarised using frequencies and percentages. The prevalence of hypertension was estimated with 95% confidence intervals.

Participant characteristics were compared by hypertension status using Pearson's chi-square test or Fisher's exact test for categorical variables, as appropriate, and independent-sample *t*-tests for continuous variables. Because the prevalence of hypertension exceeded 10%, modified Poisson regression with robust variance estimation was used to estimate crude and adjusted prevalence ratios with 95% confidence intervals.

Variables considered clinically or epidemiologically relevant, including age and sex, were retained in the multivariable model. Other variables were considered for inclusion based on prior evidence, biological plausibility and bivariate associations with hypertension at $p < 0.20$. The final multivariable model included age group, sex, marital status, working hours, alcohol consumption, physical activity and central obesity. Statistical significance was defined as $p < 0.05$.

2.7 | Ethics Statement

Ethical approval was obtained from the Research Ethics Committee of the Mbarara University of Science and Technology (MUST-2025-461), with administrative clearance from the MUST and MRRH leadership. Written informed consent was obtained from all participants prior to enrolment. Participant confidentiality was ensured through anonymised unique identifiers, and all electronic data were stored in password-protected files that were accessible only to the research team. This study adhered to the ethical principles of the Declaration of Helsinki.

3 | Results

3.1 | Participant Characteristics

A total of 231 employees were included in the analysis, of which 164 (71.0%) were university employees and 67 (29.0%) were hospital employees. The mean age was 41.1 ± 9.3 years, and 139 (60.2%) participants were male. Most participants were married (70.6%) and reported working more than 8 h per day (75.3%). 77 participants (33.3%) reported current alcohol consumption. Among current drinkers, the median duration of alcohol use was 8.0 years (IQR, 4.0–14.0 years). Participants reported consuming a mean of 3.2 ± 1.8 standard drinks per drinking occasion and drinking on a mean of 2.1 ± 1.2 days per week.

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TABLE 1 | Sociodemographic, occupational, behavioural and anthropometric characteristics of participants according to hypertension status ($N = 231$).

Characteristic	Category	Total *n* (%)	No hypertension ($n = 167$) *n* (%)	Hypertension ($n = 64$) *n* (%)	*p* value
Age (years)	—	41.1 (9.3)	40.3 (9.0)	43.2 (9.9)	**0.035**
Age category (years)	18–34	62 (26.8)	46 (27.5)	16 (25.0)	0.050
	35–49	127 (55.0)	97 (58.1)	30 (46.9)	
	≥ 50	42 (18.2)	24 (14.4)	18 (28.1)	
Sex	Male	139 (60.2)	103 (61.7)	36 (56.3)	0.450
	Female	92 (39.8)	64 (38.3)	28 (43.8)	
Marital status	Unmarried	68 (29.4)	55 (32.9)	13 (20.3)	0.060
	Married	163 (70.6)	112 (67.1)	51 (79.7)	
Type of workplace	Hospital	67 (29.0)	54 (32.3)	13 (20.3)	0.072
	University	164 (71.0)	113 (67.7)	51 (79.7)	
Working hours	Standard (≤ 8 h/day)	57 (24.7)	45 (26.9)	12 (18.8)	0.200
	Extended (> 8 h/day)	174 (75.3)	122 (73.1)	52 (81.3)	
Current alcohol consumption	No	154 (66.7)	118 (70.7)	36 (56.3)	**0.038**
	Yes	77 (33.3)	49 (29.3)	28 (43.8)	
Physical activity level	Low	87 (37.7)	52 (31.1)	35 (54.7)	**0.003**
	Moderate	115 (49.8)	94 (56.3)	21 (32.8)	
	High	29 (12.6)	21 (12.6)	8 (12.5)	
Body mass index (BMI)	Underweight	2 (0.9)	2 (1.2)	0 (0.0)	**< 0.001**
	Normal weight	96 (41.6)	79 (47.3)	17 (26.6)	
	Overweight	86 (37.2)	65 (38.9)	21 (32.8)	
	Obese	47 (20.3)	21 (12.6)	26 (40.6)	
Waist circumference	Normal	162 (70.1)	128 (76.6)	34 (53.1)	**< 0.001**
	Increased	69 (29.9)	39 (23.4)	30 (46.9)	

Note: Bold values indicate statistically significant differences between participants with and without hypertension ($p < 0.05$).

Overall, 47 (20.3%) participants were obese and 69 (29.9%) had increased waist circumference. The mean age was higher among participants with hypertension than among those without hypertension (43.2 ± 9.9 vs. 40.3 ± 9.0 years; $p = 0.035$). Significant differences in hypertension status were observed across alcohol consumption ($p = 0.038$), physical activity level ($p = 0.003$), BMI ($p < 0.001$) and waist circumference ($p < 0.001$) (Table 1).

3.2 | Previous Clinical Hypertension Diagnosis and Measured Blood Pressure Categories

Among 231 participants, 24 (10.39%) reported a prior clinical diagnosis of hypertension, whereas 207 (89.61%) reported no diagnosis. Of the 64 participants with measured hypertension, defined as Stage 1 or Stage 2 blood pressure according to American Heart Association criteria, 17 (26.56%) had a prior clinical diagnosis and 47 (73.44%) had no diagnosis (Table 2). The proportion without a clinical diagnosis was 86.49% (32/37) among participants with Stage 1 hypertension and 55.56% (15/27) among those with Stage 2 hypertension.

Among the 24 participants with a clinical diagnosis of hypertension, 15 (62.50%) reported current antihypertensive medication use. Overall, 15 of the 64 participants with measured hypertension (23.44%) were receiving antihypertensive medication. None of the treated participants had normal blood pressure at assessment: 4 (26.67%) had Stage 1 hypertension and 11 (73.33%) had Stage 2 hypertension.

3.3 | Prevalence of Measured Hypertension

Overall, 64 of 231 participants had hypertension, corresponding to a prevalence of 27.7% (95% CI: 22.3%–33.9%). Of these 64 participants, 37 (16.0% of the total sample) had Stage 1 hypertension and 27 (11.7%) had Stage 2 hypertension. Overall, 153 (66.2%) participants had normal blood pressure and 14 (6.1%) had elevated blood pressure, as detailed in Table 2.

Among participants with measured hypertension, 17 (26.6%) reported a previous clinical diagnosis of hypertension, whereas 47 (73.4%) reported no previous diagnosis. In the overall sample, 24 participants (10.4%) reported a previous diagnosis of hypertension and 15 (6.5%) reported current antihypertensive treatment. Of the 184 participants (79.7%) who reported having had their blood pressure measured during the preceding 12 months, 47 participants nevertheless had hypertension without a previous clinical diagnosis.

3.4 | Blood Pressure Distribution by Behavioural Characteristics

Blood pressure distributions varied by physical activity and alcohol consumption status (Figure 1). Among participants with high or moderate physical activity, 75% had normal blood pressure, compared with 52% among those with low physical activity. Stage 1 or 2 hypertension was present in 17%, 22% and 41% of participants with high, moderate and low physical activity, respectively. Stage 2 hypertension was also more frequent

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TABLE 2 | Measured blood pressure categories according to self-reported previous clinical diagnosis of hypertension among employees of a tertiary academic–healthcare institution in southwestern Uganda ($N = 231$).

AHA measured blood pressure category	No previous clinical diagnosis, *n* (%)[a]	Previous clinical diagnosis, *n* (%)[b]	Total, *n* (%)[c]
Normal BP	152 (73.4)	1 (4.2)	153 (66.2)
Elevated BP	8 (3.9)	6 (25.0)	14 (6.1)
Stage 1 hypertension	32 (15.5)	5 (20.8)	37 (16.0)
Stage 2 hypertension	15 (7.2)	12 (50.0)	27 (11.7)
Total	207 (100.0)	24 (100.0)	231 (100.0)

Note: AHA categories were based on blood pressure measured at study assessment.
Abbreviations: AHA = American Heart Association, BP = blood pressure.
[a]Percentages calculated using 207 participants without a previous clinical diagnosis as the denominator.
[b]Percentages calculated using 24 participants with a previous clinical diagnosis as the denominator.
[c]Percentages calculated using all 231 study participants as the denominator.

in the low physical activity group (18%) than in the high (7%) or moderate (8%) groups (Figure 1). Similarly, 70% of nondrinkers had normal blood pressure compared with 58% of current alcohol consumers, while Stage 1 and 2 hypertension were observed in 24% and 37%, respectively.

3.5 | Factors Associated With Hypertension

In the crude analysis, current alcohol consumption, low physical activity and obesity risk were associated with a higher prevalence of hypertension. Participants reporting current alcohol consumption had a 56% higher crude prevalence of hypertension than noncurrent drinkers (cPR = 1.56; 95% CI: 1.03–2.35; $p = 0.036$). Compared with participants reporting high physical activity, those with low physical activity had a higher crude prevalence of hypertension (cPR = 2.45; 95% CI: 1.38–4.36; $p = 0.002$), whereas moderate physical activity was not associated with hypertension (cPR = 1.35; 95% CI: 0.69–2.65; $p = 0.381$). Participants classified as having central obesity risk had a higher crude prevalence of measured hypertension than those without obesity risk (cPR = 1.99; 95% CI: 1.33–2.99; $p = 0.001$) (Table 3).

In the adjusted analysis, current alcohol consumption and low physical activity remained independently associated with measured hypertension. Participants reporting current alcohol consumption had a 74% higher prevalence of hypertension than noncurrent drinkers (aPR = 1.74; 95% CI: 1.08–2.78; $p = 0.022$). Participants with low physical activity had more than twice the prevalence of hypertension compared with those reporting high physical activity (aPR = 2.08; 95% CI: 1.13–3.83; $p = 0.019$). Moderate physical activity was not significantly associated with hypertension relative to high physical activity (aPR = 1.30; 95% CI: 0.66–2.56; $p = 0.457$). Central obesity was also not independently associated with hypertension after adjustment (aPR = 1.47; 95% CI: 0.90–2.40; $p = 0.126$) (Table 3).

4 | Discussion

This study assessed the prevalence of hypertension and its associated factors among employees of a tertiary academic–healthcare institution in southwestern Uganda. More than one-quarter of participants had hypertension, and a substantial proportion of those with measured hypertension had not previously received a clinical diagnosis. Current alcohol consumption and low physical activity, compared with high physical activity, were independently associated with a higher prevalence of hypertension. In contrast, moderate physical activity was not significantly associated with hypertension. These findings highlight the importance of modifiable behavioural risk factors and workplace-based prevention in this population.

An important finding was the substantial gap between measured hypertension and prior clinical recognition, suggesting that many employees with elevated blood pressure may remain unidentified despite opportunities for screening. This highlights that blood pressure measurement alone may be insufficient to achieve effective hypertension detection and management. Screening programmes should therefore extend beyond measurement to include clear communication of results, repeat assessment to confirm persistently elevated blood pressure, appropriate referral for diagnostic evaluation and mechanisms to facilitate linkage to and continuity of care. Integrating these components into workplace health programmes could strengthen early detection and improve the identification and management of hypertension among employees.

The observed prevalence of hypertension in the current study is consistent with evidence of a substantial hypertension burden among adults in Uganda and SSA (ranging from 20% to 40%) [2, 17, 25]. This prevalence is also comparable to findings from occupational studies conducted among healthcare workers and other employed populations in the region [17]. However, direct comparisons should be made cautiously because the present study used the ACC/AHA threshold of $\geq 130/80$ mmHg, whereas many population-based studies define hypertension using $\geq 140/90$ mmHg [16]. In addition, blood pressure was measured during a single study visit; therefore, the findings should be interpreted as the prevalence of elevated blood pressure meeting hypertension thresholds at the study assessment rather than confirmed persistent hypertension.

Current alcohol consumption was independently associated with a 74% higher prevalence of measured hypertension. This finding is consistent with epidemiological evidence indicating a dose-dependent relationship between alcohol intake and blood pressure [26, 27]. Potential mechanisms include sustained sympathetic nervous-system activation, reduced endothelial nitric-oxide bioavailability, activation of the renin-angiotensin-aldosterone system and increased vascular smooth-muscle tone [28, 29]. Although alcohol use was associated with hypertension in this study, the cross-sectional design precludes conclusions about temporality or causality.

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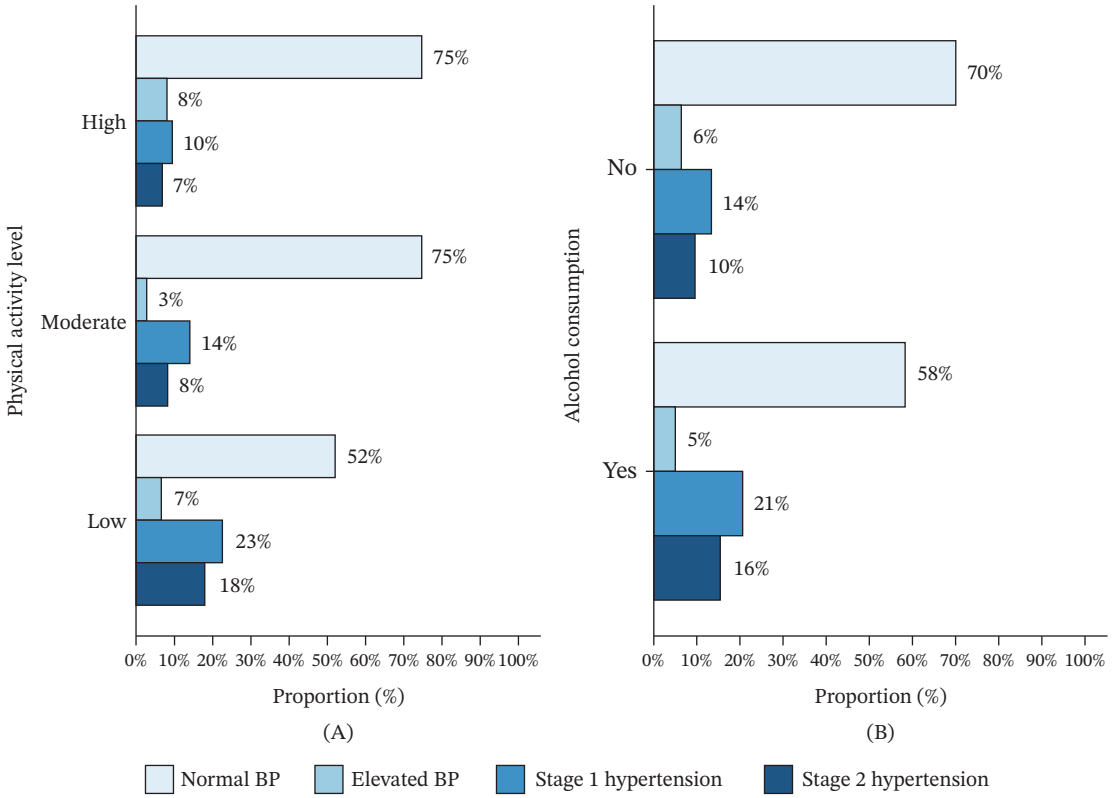

FIGURE 1 | Distribution of blood pressure categories according to behavioural characteristics. (A) Distribution by physical activity level; (B) distribution by alcohol consumption status. Bars represent within-subgroup percentages of participants with normal blood pressure, elevated blood pressure, Stage 1 hypertension and Stage 2 hypertension.

TABLE 3 | Crude and adjusted prevalence ratios for factors associated with hypertension among employees of a tertiary academic–healthcare institution in southwestern Uganda ($N = 231$).

Factor	Category	cPR	95% CI	*p* value	aPR	95% CI	*p* value
Age group (years)	18–34	1.00	(Ref)				
	35–49	0.92	0.54–1.55	0.742	0.63	0.38–1.03	0.068
	≥ 50	1.66	0.96–2.88	0.070	0.89	0.50–1.58	0.684
Sex	Male	1.00	(Ref)				
	Female	1.18	0.77–1.79	0.450	1.15	0.69–1.92	0.588
Marital status	Unmarried	1.00	(Ref)				
	Married	1.64	0.95–2.81	0.074	1.51	0.85–2.67	0.163
Working hours	≤ 8 h/day	1.00	(Ref)				
	> 8 h/day	1.42	0.82–2.47	0.214	1.25	0.72–2.15	0.425
Alcohol use	Noncurrent	1.00	(Ref)				
	Current drinkers	1.56	1.03–2.35	0.036	1.74	1.08–2.78	**0.022**
Physical activity	High	1.00	(Ref)				
	Low	2.45	1.38–4.36	0.002	2.08	1.13–3.83	**0.019**
	Moderate	1.35	0.69–2.65	0.381	1.30	0.66–2.56	0.457
Central obesity	No	1.00	(Ref)				
	Yes	1.99	1.33–2.99	0.001	1.47	0.90–2.40	0.126

Note: Bold values indicate statistically significant associations with hypertension ($p < 0.05$) in the crude and/or adjusted prevalence ratio analyses.

Low physical activity was independently associated with a higher prevalence of measured hypertension than high physical activity, whereas moderate physical activity was not significantly associated with hypertension. This distinction is important because the association was confined to the low-activity group rather than extending across all activity levels below the high-activity category. The finding is consistent with evidence that regular physical activity supports blood pressure control and cardiovascular health through improvements in vascular function, autonomic regulation and metabolic health [30–32]. Workplace

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interventions should therefore prioritise reducing low physical activity by creating feasible opportunities for movement and exercise during and around the working day.

These findings have practical implications for occupational health in academic and healthcare institutions. Routine blood pressure screening could identify employees with undiagnosed elevated blood pressure and facilitate early linkage to care. Workplace wellness programmes should prioritise physical activity promotion, particularly among employees with low-activity levels, alongside alcohol-risk reduction, weight management support and follow-up counselling. Such interventions may benefit employee health and support institutional productivity and continuity of academic and clinical services.

This study had several limitations. First, the cross-sectional design precludes causal inference and does not establish a temporal relationship between exposure and hypertension. Second, blood pressure measurements were obtained during a single study visit and may not reflect persistent hypertension. Third, alcohol consumption and physical activity were self-reported and may have been subject to recall and social desirability bias. Fourth, dietary determinants of blood pressure were not measured. In particular, sodium and potassium intake, including discretionary salt use, were not assessed using 24-h urinary sodium excretion or a validated dietary instrument [33]. In addition, several potentially relevant confounders, including objectively assessed occupational stress, sleep disruption related to shift work, family history of premature CVD and renal function, were not measured. The absence of these variables may have resulted in residual confounding. Fifth, although employees were selected using stratified random sampling from institutional personnel registers and no eligible employee declined participation, the study was conducted within one academic–healthcare setting comprising two institutions. The findings may therefore not be generalisable to other academic, healthcare, public sector, informal-sector, or nonurban workplaces in Uganda. Despite these limitations, this study provides important evidence from an understudied occupational population in Uganda and contributes to the growing literature on workplace cardiovascular health in SSA.

5 | Conclusion

More than one-quarter of employees at this tertiary academic–healthcare institution had hypertension based on the 2017 ACC/AHA blood pressure classification, indicating a substantial burden of cardiovascular risk in this workforce. Current alcohol consumption and low physical activity, relative to high physical activity, were independently associated with a higher prevalence of hypertension. Moderate physical activity was not significantly associated with hypertension. These findings support workplace-based blood pressure screening and targeted risk-reduction interventions that promote physical activity, reduce alcohol-related risk and strengthen referral and follow-up for employees with elevated blood pressure. Longitudinal studies are needed to clarify causal pathways and evaluate the effectiveness of workplace-based hypertension-prevention interventions.

Author Contributions

Agapiti Hipoliti Chuwa: conceived the study, data curation, writing–original draft, writing–review and editing; Peter Kangwagye: technical and academic input, writing–review and editing; Ronald Ouma Omolo: technical and academic input, writing–review and editing; David Collins Agaba: data curation, writing–review and editing; Richard Migisha: data curation, writing–original draft, writing–review and editing.

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Disclosure

All authors contributed to the development of the manuscript and approved the final version for publication. The funder had no role in the study design, data collection, data analysis, data interpretation, manuscript preparation, decision to publish, or submission of this manuscript for publication.

Ethics Statement

Ethical approval was obtained from the Research Ethics Committee of the Mbarara University of Science and Technology (MUST-2025–461), with administrative clearance from the MUST and MRRH leadership. Written informed consent was obtained from all participants prior to enrolment.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The datasets analysed in this study are available from the corresponding author upon reasonable request.

References

1. A. Sheikh, O. N. Ombiro, H. R. Wurie, et al., "Transforming Hypertension Management With Digital Technology: A Retrospective Cohort Study in Four Sub-Saharan African Countries," *BMJ Public Health* 4, no. 2 (2026): e003394, https://doi.org/10.1136/bmjph-2025-003394.

2. P. K. Kakoma, E. K. Muyumba, O. Mukuku, et al., "Prevalence and Associated Factors of Hypertension Among Adults in Sub-Saharan Africa: A Systematic Review and Meta-Analysis of Community-based Studies," *BMC Cardiovascular Disorders* 26, no. 1 (2026): 294, https://doi.org/10.1186/s12872-026-05686-z.

3. A. M. Doro Altan, B. Tchenebou, K. Iffio, et al., "Hypertension Outcomes in a Fragile Setting: Predictors of Blood Pressure Reduction and Control in the Central African Republic," *Frontiers in Public Health* 13 (2025): 1664189, https://doi.org/10.3389/fpubh.2025.1664189.

4. C. O. Egekeze, C. Chukwu, D. Vieira, J. Gyamfi, and J. P. Allegrante, "Assessing Implementation Outcomes From Studies Addressing Medication Adherence for Hypertension Management in Sub-Saharan Africa: A Systematic Review," *BMC Public Health* 25, no. 1 (2025): 4085, https://doi.org/10.1186/s12889-025-24438-w.

5. A. Wells, M. Previtera, M. Markey, et al., "Work as a Social Determinant of Health on Cardiovascular and Musculoskeletal Diseases: A Literature Review," *Work* 82, no. 2 (2025): 578–593, https://doi.org/10.1177/10519815251346449.

6. D. Vandika and A. Maliya, "The Relationship Between Dietary Patterns, Physical Activity, and Stress Levels With the Incidence of Hypertension Among Adults of Productive Age," *Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)* 11, no. 4 (2025): 628–635, https://doi.org/10.22487/htj.v11i4.1790.

7. M. Kivimäki and I. Kawachi, "Work Stress as a Risk Factor for Cardiovascular Disease," *Current Cardiology Reports* 17, no. 9 (2015): 630, https://doi.org/10.1007/s11886-015-0630-8.

1707, 2026, 1, Downloaded from https://onlinelibrary.wiley.com/doi/10.1155/ijhy/2910299 by Readcube (Labtiva Inc.), Wiley Online Library on [26/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

8. Who, *Hypertension Fact Sheet* (Geneva: World Health Organization (WHO), 2023), https://www.who.int/news-room/fact-sheets/detail/hypertension.

9. S. Oparil, M. C. Acelajado, G. L. Bakris, et al., "Hypertension," *Nature Reviews Disease Primers* 4, no. 1 (2018): 18014, https://doi.org/10.1038/nrdp.2018.14.

10. B. Williams, G. Mancia, W. Spiering, et al., "ESC/ESH Guidelines for the Management of Arterial Hypertension," *European Heart Journal* 39, no. 33 (2018): 3021–3104, https://doi.org/10.1093/eurheartj/ehy339.

11. Z. Hu, X. Wang, C. Hong, et al., "Workplace-Based Primary Prevention Intervention Reduces Incidence of Hypertension: A Post Hoc Analysis of Cluster Randomized Controlled Study," *BMC Medicine* 21, no. 1 (2023): 214, https://doi.org/10.1186/s12916-023-02915-6.

12. V. Worley, P. Fraser, S. Allender, and K. A. Bolton, "Describing Workplace Interventions Aimed to Improve Health of Staff in Hospital Settings: A Systematic Review," *BMC Health Services Research* 22, no. 1 (2022): 459, https://doi.org/10.1186/s12913-021-07418-9.

13. R. Alhajaji, M. Z. Alfahmi, S. A. Alshaikhi, et al., "The Influence of Workplace Stressors on the Risk of Cardiovascular Diseases Among Healthcare Providers: A Systematic Review," *Frontiers in Psychiatry* 16 (2025): 1461698, https://doi.org/10.3389/fpsyt.2025.1461698.

14. C. Moretti Anfossi, M. Ahumada Muñoz, C. Tobar Fredes, et al., "Work Exposures and Development of Cardiovascular Diseases: A Systematic Review," *Annals of Work Exposures and Health* 66, no. 6 (2022): 698–713, https://doi.org/10.1093/annweh/wxac004.

15. K. E. MacLeod, Z. Ye, B. Donald, and G. Wang, "A Literature Review of Productivity Loss Associated With Hypertension in the United States," *Population Health Management* 25, no. 3 (2022): 297–308, https://doi.org/10.1089/pop.2021.0201.

16. D. Guwatudde, G. Mutungi, R. Wesonga, et al., "The Epidemiology of Hypertension in Uganda: Findings From the National Non-Communicable Diseases Risk Factor Survey," *PLoS One* 10, no. 9 (2015): e0138991, https://doi.org/10.1371/journal.pone.0138991.

17. U. Majumdar, R. Nanyonga Clarke, A. E. Moran, et al., "Hypertension Screening, Prevalence, Treatment, and Control at a Large Private Hospital in Kampala, Uganda: A Retrospective Analysis," *PLOS Global Public Health* 2, no. 5 (2022): e0000386, https://doi.org/10.1371/journal.pgph.0000386.

18. A. Jackson-Morris, S. Masyuko, L. Morrell, I. Kataria, E. L. Kocher, and R. Nugent, "Tackling Syndemics by Integrating Infectious and Noncommunicable Diseases in Health Systems of Low-and middle-Income Countries: A Narrative Systematic Review," *PLOS Global Public Health* 4, no. 5 (2024): e0003114, https://doi.org/10.1371/journal.pgph.0003114.

19. A. H. Chuwa, P. Kangwagye, D. C. Agaba, R. O. Omolo, and R. Migisha, "Metabolic Syndrome Prevalence and Correlates among University and Hospital Staff in Southwestern Uganda," *Scientific Reports* (2026): https://doi.org/10.1038/s41598-026-76542-5.

20. Z. Geto, F. Challa, T. Lejisa, et al., "Cardiometabolic Syndrome and Associated Factors Among Ethiopian Public Servants, Addis Ababa, Ethiopia," *Scientific Reports* 11, no. 1 (2021): 20635, https://doi.org/10.1038/s41598-021-99913-6.

21. C. L. Craig, A. L. Marshall, M. Sjöström, et al., "International Physical Activity Questionnaire: 12-Country Reliability and Validity," *Medicine & Science in Sports & Exercise* 35, no. 8 (2003): 1381–1395, https://doi.org/10.1249/01.MSS.0000078924.61453.FB.

22. G. Alberti, P. Zimmet, J. Shaw, and S. M. Grundy, "The IDF Consensus Worldwide Definition of the Metabolic Syndrome," *Lancet (London, England)* 366 (2005): 1059–1062.

23. K. G. Alberti, P. Zimmet, and J. Shaw, "Metabolic Syndrome: A New World-Wide Definition. A Consensus Statement From the International Diabetes Federation," *Diabetic Medicine: A Journal of the British Diabetic Association* 23, no. 5 (2006): 469–480, https://doi.org/10.1111/j.1464-5491.2006.01858.x.

24. P. Muntner, D. Shimbo, R. M. Carey, et al., "Measurement of Blood Pressure in Humans: A Scientific Statement From the American Heart Association," *Hypertension Dallas, Tex* 73, no. 5 (2019): e35–e66, https://doi.org/10.1161/hyp.0000000000000087.

25. T. M. Aytenew, A. Kassaw, A. Simegn, et al., "Uncontrolled Hypertension Among Hypertensive Patients in Sub-Saharan Africa: A Systematic Review and Meta-Analysis," *PLoS One* 19, no. 6 (2024): e0301547, https://doi.org/10.1371/journal.pone.0301547.

26. F. S. Di, T. Filippini, P. K. Whelton, et al., "Alcohol Intake and Blood Pressure Levels: A Dose-Response Meta-Analysis of Nonexperimental Cohort Studies," *Hypertension* 80, no. 10 (2023): 1961–1969, https://doi.org/10.1161/hypertensionaha.123.21224.

27. M. Cecchini, T. Filippini, P. K. Whelton, et al., "Alcohol Intake and Risk of Hypertension: A Systematic Review and Dose-Response Meta-Analysis of Nonexperimental Cohort Studies," *Hypertension Dallas, Tex* 81, no. 8 (2024): 1701–1715, https://doi.org/10.1161/hypertensionaha.124.22703.

28. O. M. Okojie, F. Javed, L. Chiwome, and P. Hamid, "Hypertension and Alcohol: A Mechanistic Approach," *Cureus* 12, no. 8 (2020): e10086, https://doi.org/10.7759/cureus.10086.

29. A. Vacca, L. Bulfone, S. Cicco, et al., "Alcohol Intake and Arterial Hypertension: Retelling of a Multifaceted Story," *Nutrients* 15, no. 4 (2023): 958, https://doi.org/10.3390/nu15040958.

30. Who, *Guidelines on Physical Activity and Sedentary Behaviour* (Geneva: World Health Organization, 2020), https://www.who.int/publications/i/item/9789240015128.

31. K. L. Piercy, R. P. Troiano, R. M. Ballard, et al., "The Physical Activity Guidelines for Americans," *JAMA* 320, no. 19 (2018): 2020–2028, https://doi.org/10.1001/jama.2018.14854.

32. A. Parvanova, E. Reseghetti, M. Abbate, and P. Ruggenenti, "Mechanisms and Treatment of Obesity-Related Hypertension-Part 1: Mechanisms," *Clinical Kidney Journal* 17, no. 1 (2024): sfad282, https://doi.org/10.1093/ckj/sfad282.

33. A. Mente, M. O'Donnell, S. Rangarajan, et al., "Associations of Urinary Sodium Excretion With Cardiovascular Events in Individuals With and Without Hypertension: A Pooled Analysis of Data From Four Studies," *Lancet (London, England)* 388, no. 10043 (2016): 465–475, https://doi.org/10.1016/S0140-6736(16)30467-6.

Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Supporting Information.** Supporting Figure S1. Participant flow diagram for the hypertension analysis. The figure illustrates participant eligibility and inclusion in the hypertension analysis. Eight individuals were excluded before enrolment because they were ineligible: two were pregnant, while six had been employed at the institution for less than six months. The remaining 231 participants were included in the final hypertension analysis.

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