

Original Research Article

The effect of stress on cardiovascular system and its awareness among bank workers in Makurdi, Benue state

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ABSTRACT

Background: Cardiovascular diseases (CVDs) remain the leading cause of global mortality, and stress is a key modifiable risk factor, particularly in occupational settings such as banking. This study assessed the effect of stress on the cardiovascular system and the level of awareness among bank workers in Makurdi, Benue State, Nigeria.

Methods: A descriptive cross-sectional study was conducted among 133 bank employees from five banks. Physical measurements including blood pressure, fasting blood sugar, and body mass index (BMI) were collected using standard instruments. A structured questionnaire was administered to assess lifestyle factors and awareness of cardiovascular risk factors. Chi-square tests were applied using statistical package for the social sciences (SPSS) version 26 to determine associations at a 5% significance level.

Results: The prevalence of hypertension was significantly higher among males (33.8%) compared to females (10.7%), and among older age groups (>40 years, 73.3%) versus younger groups (21–30 years, 28.7%). Longer job tenure (>10 years) was associated with higher prevalence of hypertension (32.1%). Significant associations were found between hypertension and lack of knowledge, overtime work, BMI and alcohol use ($p < 0.05$). Additionally, diabetes mellitus and obesity were linked to job tenure and snacking habits. However, some variables, such as blood glucose level, smoking and exercise, showed no significant association with hypertension ($p > 0.05$).

Conclusions: The study concludes that occupational stress contributes significantly to CVD risk factors among bank workers in Makurdi. Awareness levels of cardiovascular risk factors were generally low, underscoring the need for targeted interventions on stress management and cardiovascular health.

Keywords: Awareness, Cardiovascular-diseases, Diabetes-mellitus, Hypertension, Obesity, Stress

INTRODUCTION

Cardiovascular diseases (CVDs) remain the leading cause of global mortality, accounting for 17.9 million deaths annually, representing 32% of all global deaths.¹ Low- and middle-income countries like Nigeria disproportionately bear this burden due to limited access to preventive care and early diagnosis.² Among the modifiable risk factors for

CVDs, stress, particularly occupational stress has gained growing attention.³

Occupational stress is a psychosocial hazard that contributes to elevated cortisol, increased blood pressure, metabolic disturbances, and adverse health behaviours such as alcohol consumption, smoking, physical inactivity, and poor diet.⁴⁻⁶ The banking sector is notably associated with high levels of work stress due to long hours, tight

deadlines, performance pressure, and customer demands.⁷ These stressors may cumulatively affect cardiovascular health through neuroendocrine responses that increase cortisol levels, heart rate, and vascular resistance.⁸

Globally, an estimated 1.28 billion adults aged 30–79 years have hypertension, with two-thirds living in low- and middle-income countries.⁹ Alarming, less than half of these individuals are aware of their hypertensive status.¹⁰ In Nigeria, the growing prevalence of hypertension and diabetes has been linked to urbanization, sedentary lifestyles, and changing dietary patterns.¹¹ However, the level of awareness and preventive behaviour remains low, particularly among the working population.¹²

Bank workers, often exposed to long work hours and minimal physical activity, face a unique risk profile for developing CVDs.¹³ Prolonged psychological stress can lead to chronic activation of the hypothalamic–pituitary–adrenal axis, increasing the risk of atherosclerosis, insulin resistance, and arrhythmias.¹⁴ Stress also indirectly contributes to poor cardiovascular outcomes through behavioural risk factors like smoking and unhealthy eating habits.¹⁵

In Nigeria, CVDs account for 11% of all non-communicable disease deaths and are a significant contributor to early mortality and healthcare costs.¹⁶ Despite this, there is inadequate research focused on the occupational link between stress and cardiovascular health, especially among specific groups like bankers in urban centers.¹⁷

The importance of addressing stress in cardiovascular health cannot be overemphasized. Psychological interventions, workplace wellness programs, and routine cardiovascular screenings have been shown to reduce the risk of adverse outcomes when implemented early.¹⁸ Moreover, the application of behavioural change theories such as protection motivation theory (PMT) and the health action process approach (HAPA) provides a framework for understanding how individuals assess risk and adopt protective health behaviours.^{19,20}

This study was conducted to assess the impact of stress on cardiovascular health and evaluate awareness levels among bank workers in Makurdi, Benue State. Findings from this research are intended to support evidence-based workplace health interventions and inform public health strategies aimed at reducing stress-related cardiovascular morbidity.

METHODS

Study design and population

A descriptive cross-sectional study was conducted among 133 bank workers in Makurdi, Benue State. The study lasted three months, August 2023 to November 2023. The participants were drawn from five banks: Access Bank,

Fidelity Bank, First Bank, Guaranty Trust Bank, and Union Bank. 132 sample size was calculated but 133 subjects were used. Cochran's sample size formula for finite population was used to arrive at the sample size.

$$n = n_0/1 + n_0 - 1/N$$

But,

$$n_0 = Z^2 \times p \times (1 - p)/e^2$$

Where, n_0 =initial sample size (if population is large or unknown), Z =Z-score corresponding to the desired confidence level (1.96 for 95% confidence), p =estimated proportion of the population (0.5 if unknown), e =margin of error (0.05 for $\pm 5\%$), n =final adjusted sample size, and N =population size.

Data collection

Physical assessments included measurement of blood pressure using a sphygmomanometer and stethoscope (Accuson^(R) mercury sphygmomanometer and a 3M Littmann^(R) stethoscope. Blood pressure levels were classified according to Giuseppe et al. The categories used were as follows, optimal blood pressure, systolic blood pressure (SBP) less than 120 mmHg and diastolic blood pressure (DBP) less than 80 mmHg. Normal blood pressure, SBP between 120–129 mmHg and/or DBP between 80–84 mmHg. High normal blood pressure: SBP between 130–139 mmHg and/or DBP between 85–89 mmHg. Grade 1 hypertension, SBP between 140–159 and/or DBP between 90–99 mmHg. Grade 2 hypertension, SBP between 160–179 and/or DBP between 100–109 mmHg. Grade 3 hypertension, SBP ≥ 180 and/or DBP ≥ 110 or higher and/or DBP of 90 mmHg or higher.²¹

Fasting blood glucose (FBG) levels was measured using a glucometer (Accucheck). Fasting plasma glucose (FPG) levels were classified according to the diagnostic criteria of the American Diabetes Association (ADA, 2024). A fasting glucose level of less than 100 mg/dl (5.6 mmol/l) was considered normal, while values between 100 and 125 mg/dl (5.6–6.9 mmol/l) indicated prediabetes (impaired fasting glucose). A fasting glucose level of 126 mg/dl (7.0 mmol/l) or higher on at least two occasions was classified as diabetes mellitus.²²

The body mass index (BMI) was measured using a weighing scale (MEDIJET BR9905) and meter rule. The BMI was calculated using the formula:

$$BMI = Weight (kg)/height^2(m^2)$$

The participants were classified on the basis of their BMI into underweight (BMI <18.5), normal (BMI of 18.5 to <25), overweight (BMI of 25 to <30) and obese (BMI ≥ 30).²³

A structured interviewer-administered questionnaire was used to collect data on demographic information, work history, lifestyle habits, and awareness of CVD risk factors.

Sampling

Simple random sampling was used to select participants. Inclusion criteria were full-time bank employees aged 21 and above, while those with known chronic diseases or who declined to participate were excluded.

Data analysis

Data were analysed using statistical package for the social sciences (SPSS) version 26. Chi-square tests were used to examine associations between stress indicators and cardiovascular outcomes. Statistical significance was set at $p < 0.05$.

RESULTS

Association between hypertension and selected risk factors

Chi-square analysis showed statistically significant associations between hypertension and factors such as gender, age, obesity, overtime work, alcohol use, and lack of awareness about hypertension ($p < 0.05$). Notably, smoking, exercise, sleep disturbances, and type of bank were not significantly associated ($p > 0.05$) (Table 1).

Duration of employment and hypertension

A significant association ($\chi^2 = 16.552$, $p = 0.011$) was observed between the duration of employment and blood pressure status. Workers employed for more than 10 years showed higher rates of hypertension compared to those with shorter tenure (Table 2).

Body mass index and blood pressure

BMI was significantly associated with hypertension ($\chi^2 = 18.851$, $p = 0.026$). Obese and overweight respondents had a higher prevalence of hypertension than those with healthy weight (Table 3).

Table 1: Association between selected risk factors and hypertension among bank workers using Chi-square analysis.

Risk factor	P value
Gender	0.001
Age	0.01
BMI	0.026
FBS	0.825
Overtime work	0.038
Alcohol use	0.03
Lack of hypertension awareness	0.001
Smoking	0.481
Exercise	0.597
Sleeplessness due to work	0.321
Bank	0.351

Table 2: Relationship between blood pressure levels and duration of employment among respondents.

Variables	Time spent on the job			
	0-4	5-10	>10	Total
BP value				
Optimal	20	18	1	39
Normal	14	15	11	40
High normal	5	10	7	22
Hypertension	6	17	9	32
Total	45	60	28	133

$\chi^2 = 16.552$, $df = 6$, $p = 0.011$ ($p < 0.05$)

Fasting blood glucose levels

There was no significant relationship between fasting blood glucose levels and blood pressure ($\chi^2 = 2.868$, $p = 0.825$), though the majority of hypertensive participants fell within the normal or pre-diabetes range (Table 4).

Bank of employment

No significant differences in hypertension prevalence were found across different banks ($\chi^2 = 13.248$, $p = 0.351$), indicating similar occupational stress profiles industry-wide (Table 5).

Table 3: Association between blood pressure and body mass index (BMI) categories among respondents.

Variables	BMI				Total
	Under weight	Healthy weight	Over weight	Obesity	
BP value					
Optimal	4	15	16	4	39
Normal	0	21	16	3	40
High normal	0	6	11	5	22
Hypertension	0	9	15	8	32
Total	4	51	58	20	133

$\chi^2 = 18.851$, $df = 9$, $p = 0.026$ ($p < 0.05$)

Table 4: Association between blood pressure and fasting blood glucose levels among respondents.

Variables	FBG			
	Normal	Pre-diabetes	Diabetes	Total
BP value				
Optimal	30	9	0	39
Normal	28	11	1	40
High normal	18	4	0	22
Hypertension	22	9	1	32
Total	98	33	2	133

 $\chi^2=2.868$, df=6, p=0.825 (p>0.05)

Table 5: Relationship between blood pressure status and bank of employment among respondents.

Variables	Bank				
	Access bank	Fidelity bank	First bank	GT bank	Union Bank
BP value					
Optimal	6	11	5	8	9
Normal	8	8	10	10	4
High normal	5	3	6	5	3
Hypertension	8	2	4	9	9
Total	27	24	25	32	25

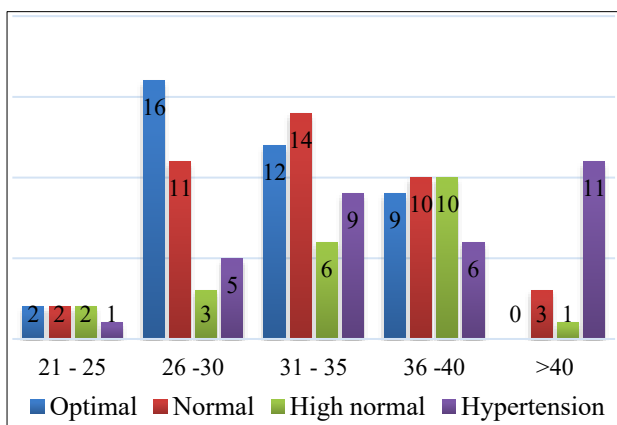
 $\chi^2=13.248$, df=12, p=0.351 (p>0.05)

Awareness of hypertension

Only 3.8% of respondents (n=5) were aware of their hypertensive status. A significant association was found between lack of awareness and hypertension ($\chi^2=16.398$, p=0.001) (Table 6).

Table 6: Association between hypertension status and awareness of hypertension among respondents.

Variables	Yes	No	Total
BP value			
Optimal	0	39	39
Normal	0	40	40
High normal	0	22	22
Hypertension	5	27	32
Total	5	128	133

 $\chi^2=16.398$, df=3, p=0.001 (p<0.05)

Figure 1: Prevalence of hypertension by age.

Gender differences in hypertension

Gender was significantly associated with blood pressure status ($\chi^2=17.320$, p=0.001). Males had higher rates of hypertension (33.8%) compared to females (10.7%) (Table 7 and Figure 1). Additional visual representation in Figure 1 shows higher hypertension rate among older workers.

Table 7: Distribution of blood pressure status by gender among bank workers.

Variables	Male	Female	Total
BP value			
Optimal	15	24	39
Normal	27	13	40
High normal	9	13	22
Hypertension	26	6	32
Total	77	56	133

 $\chi^2=17.320$, df=3, p=0.001 (p<0.05)

DISCUSSION

This study evaluated the relationship between occupational stress and cardiovascular health among bank workers in Makurdi, Benue State. The findings underscore the substantial burden of hypertension in this professional group and point to several contributing factors.

In this study, males made up 57.9% of the population. 10.7% of the female participants were hypertensive as against 33.8% of the males. Among the participants, 32 subjects were hypertensive. Participants in the category of >40 years of age accounted for 34.4% followed by 31-35 years (28.1%).

This study shows association between occupational stress and cardiovascular health among bank workers in Makurdi. The observed prevalence of hypertension (24.1%) highlights a concerning public health issue within this professional group. The prevalence of hypertension among bank employees in Lagos, Nigeria was 33.3%, with higher BMI, prior diagnosis, family history, smoking, and adding salt to food as significant risk factors.²⁴ The prevalence of hypertension among bank workers in Harar, Ethiopia was 27.5% and was associated with aging, sedentary lifestyle, and obesity.²⁵

Hypertension was found to be significantly more prevalent among male bank workers, consistent with literature indicating that men have a higher cardiovascular risk profile due to hormonal, behavioural, and lifestyle factors. Globally, men—especially those under 60 years—are more susceptible to hypertension, a pattern linked to biological vulnerabilities such as reduced estrogen protection, heightened sympathetic nervous system activity, and earlier vascular aging.²⁶ A cross-sectional study in Yogyakarta, Indonesia, reported that men had 1.77 times greater odds of developing hypertension than women, attributed to higher rates of abdominal obesity, chronic conditions, and smoking.²⁷ In sub-Saharan Africa, and particularly in Nigeria, this gender disparity is further exacerbated by urbanization, unhealthy lifestyle practices, and poor health-seeking behaviour. A recent study among young adults in Nigeria revealed that men were less likely than women to be aware of their hypertensive status or to seek medical attention, thus contributing to the observed gender gap in diagnosis and management.²⁸ Furthermore, in this study, older staff exhibited higher blood pressure levels, consistent with age-related vascular changes and cumulative exposure to stressors.^{1,3,5,9} These findings support previous reports that age and gender remain non-modifiable but critical predictors of hypertension risk.^{6,10}

Job tenure also correlated with elevated blood pressure suggesting a cumulative effect of work-related stress.^{3,5,7,8} Overtime work, alcohol use, and obesity were significant risk factors, consistent with previous study by Ajayi and Sharma and Williams.^{7,15} However, smoking and exercise were not significant, possibly due to underreporting.^{4,14} Overtime work is commonly associated with chronic stress, increased sympathetic nervous system activity, and poor sleep hygiene, all of which contribute to elevated blood pressure. Prolonged work hours may also limit opportunities for physical activity and promote unhealthy dietary habits, further exacerbating cardiovascular risk. Alcohol use, especially in excessive amounts, has been consistently linked to increased blood pressure due to its effects on vascular tone, oxidative stress, and sympathetic activation. Additionally, obesity contributes to hypertension through multiple mechanisms, including insulin resistance, increased leptin activity, inflammation, and volume overload.²⁹

The observed low level of hypertension awareness (3.8%) among participants in this study reflects broader national

trends in Nigeria, where poor knowledge of non-communicable diseases (NCDs) remains a persistent challenge, particularly among the working population.^{10,12} This finding highlights a critical gap in preventive healthcare and emphasizes the urgent need for targeted interventions. Globally, hypertension remains a major public health concern, with awareness levels alarmingly low. It is estimated that nearly half of all individuals with hypertension are unaware of their condition, largely due to its asymptomatic nature, limited access to routine screening, and inadequate health literacy—especially in low- and middle-income countries.³⁰ These barriers contribute significantly to delayed diagnosis and poor management of the condition. In India, a systematic review and meta-analysis of 206 studies demonstrated that awareness of hypertension is markedly lower in rural areas (25.3%) compared to urban areas (42.0%). Treatment and control rates were also significantly reduced in rural settings, illustrating the persistent urban–rural divide in healthcare access and hypertension management.³¹

Similar patterns are evident across Asia. Data from the May measurement month campaign reported awareness rates of 46.2% in South Asia and 57.9% in East Asia, indicating variability within the region but consistently highlighting suboptimal awareness.³⁰ In sub-Saharan Africa, awareness rates range from 20% to 60%, depending on country context, healthcare infrastructure, and degree of urbanization. Urban populations typically exhibit higher awareness levels, attributed to greater access to healthcare services, exposure to health education, and better socioeconomic conditions.³¹ Specifically in Nigeria, a systematic review by Idoko et al analyzed 53 studies comprising 78,949 participants and found that only 29.0% of hypertensive individuals were aware of their status. Among those aware, just 12.0% were on treatment, and only 2.8% had their blood pressure under control. The same review noted a substantial rise in hypertension prevalence over the last two decades, from 8.6% in 1995 to 32.5% in 2020.¹⁰ These figures draw attention to the pressing need for comprehensive hypertension control strategies in Nigeria, particularly for working-age adults in urban environments. Overall, the evidence points to a consistent global challenge; as hypertension prevalence rises, awareness, treatment, and control efforts remain insufficient. This disparity is especially pronounced in LMICs and among occupational groups exposed to chronic stress. Effective solutions must involve context-specific interventions such as workplace-based screening, improved access to diagnostic services, public health education, and policies that encourage early detection and sustained management of hypertension.

No significant difference was observed between banks, suggesting that occupational stress is systemic across the industry. This aligns with recommendations by Myers for sector-wide stress management interventions. Integrating behavioural theories such as the health action process approach and protection motivation theory into workplace

interventions could enhance motivation and adoption of preventive behaviours.¹⁸⁻²⁰

In summary, the findings of this study agree with both national and international literature emphasizing the urgent need for preventive strategies in occupational health.^{2,6,13,17}

Limitations

This study had some notable limitations. Some banks in Makurdi declined participation, which reduced the initial sample frame and may have introduced selection bias. Among the participating banks, a few staff members were reluctant to take part in the study. Furthermore, the study was limited to Makurdi in Benue State, which may restrict the generalizability of the findings to other regions or occupational groups. Nevertheless, the study offers valuable insights into the occupational determinants of cardiovascular risk among bank workers in an urban Nigerian setting.

CONCLUSION

This study contributes significantly to understanding the complex relationship between occupational stress and cardiovascular health among bank workers in Nigeria. By highlighting the high prevalence of hypertension, low awareness levels, and the role of modifiable risk factors such as obesity, alcohol use, and overtime work, the findings advance knowledge in occupational and preventive cardiology. The results underscore the urgent need for workplace-based health interventions, periodic cardiovascular screening, and stress management programs tailored to high-stress professions. Ultimately, this study adds to the growing body of evidence linking psychosocial work factors with non-communicable diseases and supports policy development aimed at promoting cardiovascular well-being among working populations in low- and middle-income countries.

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