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Cardiometabolic Risk Profile and Malaria Prevalence Among Federal Government Agency Workers in Nigeria: Findings from a Post-Health Education Screening Program

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Abstract

Workplace health screening programs remain underutilized in Nigeria despite the rising burden of non-communicable diseases (NCDs) among working populations. Limited data exist on the health status of federal government agency workers, who represent a significant proportion of Nigeria's formal workforce. The study's objective is to assess the cardiometabolic risk profile and malaria prevalence among federal agency workers following a health education intervention on diet and lifestyle. A cross-sectional screening study was conducted in January 2024 at the National Board for Arabic and Islamic Studies (NBAIS), Abuja office, Nigeria. Following a health talk titled *"The Role of Diet and Lifestyles in Health and Diseases,"* 27 of 60 eligible staff (45% participation rate) consented to screening. Measured parameters included blood pressure (BP), anthropometric measurements (weight, height, body mass index [BMI]), random blood sugar (RBS), and malaria status using rapid diagnostic tests. The results indicated that participants' mean age was 36.4 ± 6.2 years (range: 20-44 years), with 59.3% (16/27) being female. The prevalence of cardiometabolic risk factors was substantial: hypertension (BP ≥130/80 mmHg) affected

29.6% (8/27) of participants, overweight/obesity (BMI ≥25 kg/m²) was observed in 22.2% (6/27), and elevated random blood glucose (RBS ≥140 mg/dL) was present in 7.4% (2/27). Malaria positivity rate was 0% (0/27). The low voluntary screening participation rate (45%), despite prior health education and free services, highlights significant barriers to workplace health-seeking behaviour. Nearly one-third of screened federal workers demonstrated hypertension, with additional cardiometabolic risk factors prevalent in this relatively young workforce. The low screening uptake despite health education underscores the urgent need for mandatory workplace health screening policies, targeted lifestyle interventions, and integration of NCD screening into occupational health services in Nigerian federal agencies.

Keywords: Workplace Health, Cardiometabolic Risk, Health Screening, Hypertension, Nigeria, Occupational Health, Non-Communicable Diseases, Health Education.

Introduction

Non-communicable diseases (NCDs), particularly cardiovascular diseases and diabetes, have emerged as leading causes of morbidity and mortality globally, accounting for approximately 71% of all deaths worldwide (World Health Organization [WHO], 2021). In sub-Saharan Africa, the epidemiological transition has resulted in a double burden of disease, with NCDs coexisting alongside persistent infectious disease challenges (Gouda et al., 2019). Nigeria, Africa's most populous nation, exemplifies this transition, with hypertension prevalence estimated at 28.9% among adults and diabetes prevalence at 5.8%, both showing upward trends (Adeloye et al., 2021; Uloko et al., 2018).

The workplace represents a critical setting for NCD prevention and early detection, as adults spend approximately one-third of their waking hours at work (WHO, 2007). Occupational health screening programs offer opportunities for identifying undiagnosed conditions, promoting healthy behaviours, and reducing disease-related productivity losses (Goetzel et al., 2014). However, in Nigeria, workplace health services remain poorly developed, particularly in government agencies where occupational health infrastructure is often inadequate or non-existent (Isah & Okojie, 2006; Onyemaechi et al., 2016).

Malaria remains endemic in Nigeria despite ongoing urbanization (World Health Organization, 2022), with urban federal workers often commuting from peri-urban and rural areas where sustained malaria transmission continues (Tusting et al., 2019). The significant workplace absenteeism and productivity losses linked to malaria justify its inclusion alongside cardiometabolic risk factors in occupational health assessments (Obembe et al., 2014; Ilesanmi et al., 2013). This study intentionally adopts a dual-burden lens to reflect the real-world co-existence of infectious and non-communicable diseases in

Nigerian working populations (Naing et al., 2016), recognizing that addressing both disease categories simultaneously is essential for comprehensive workplace health management (Federal Ministry of Health, Nigeria, 2020).

Federal government agencies in Nigeria employ a substantial proportion of the country's formal workforce, yet little is known about the health status of these workers (National Bureau of Statistics, 2020). Previous studies have focused predominantly on healthcare workers, industrial workers, or general population surveys, with limited attention to government administrative staff (Ulasi et al., 2010; Ordinioha & Brisibe, 2013). This gap in knowledge hampers the development of targeted occupational health interventions for this population.

Health education interventions promoting lifestyle modification represent a cornerstone of primary prevention strategies for NCDs (Aminde et al., 2017). However, the effectiveness of such interventions in motivating health-seeking behaviours, including voluntary health screening participation, remains unclear in Nigerian workplace settings. Understanding baseline health status and screening uptake following health education is essential for designing evidence-based occupational health programs.

The primary objective of this study was to assess the cardiometabolic risk profile and malaria prevalence among federal government agency workers following a health education intervention on diet and lifestyle. Secondary objectives included characterizing the demographic profile of participants, determining the prevalence of hypertension, obesity, hyperglycaemia, and malaria, and evaluating voluntary screening participation rates as an indicator of health-seeking behaviour.

MATERIALS AND METHODS

Study Design and Setting

This was a cross-sectional descriptive study conducted in January 2024 at the Abuja zonal office of the National Board for Arabic and Islamic Studies (NBAIS), a federal government agency headquartered in Kaduna, Nigeria. NBAIS is a parastatal under the Federal Ministry of Education, employing over 200 staff members across various administrative, technical, and scientific positions.

Study Population and Sampling

The study population comprised adult staff members (≥18 years) of NBAIS who attended a health education session. Sixty staff members attended the health talk titled "The Role of Diet and Lifestyles in Health and Diseases," delivered by the principal investigator. Following the health education session, participants were invited to undergo voluntary, free-of-charge health screening. Inclusion criteria were: (1) NBAIS staff member; (2) attendance at the health education session; (3) age ≥18 years; and (4) provision of informed consent. No exclusion criteria were applied. Twenty-seven participants (45% response rate) consented to screening and were enrolled in the study using a convenience sampling method.

Data Collection Procedures

Health Education Intervention: A 45-minute health talk was delivered covering the following topics: (1) overview of diet-related and lifestyle-related diseases including hypertension, diabetes, obesity, and cardiovascular diseases; (2) role of dietary factors (excessive salt, sugar, saturated fats, processed foods) in disease development; (3) importance of healthy dietary patterns emphasizing fruits, vegetables, whole grains, and lean proteins; (4) benefits of regular physical activity; (5) dangers of tobacco and excessive alcohol consumption; and (6) importance of routine health screening for early disease detection. Educational materials included PowerPoint presentations with visual aids and printed handouts.

Anthropometric Measurements: Body weight was measured to the nearest 0.1 kg using a calibrated digital scale (Omron HBF-514C, Japan) with participants wearing light clothing and no shoes. Height was measured to the nearest 0.1 cm using a portable stadiometer (Seca 213, Germany) with participants standing erect, heels together, and head positioned in the Frankfurt plane. Body mass index (BMI) was calculated as weight (kg) divided by height squared (m^2) and classified according to WHO criteria: underweight (<18.5 kg/m^2), normal weight (18.5-24.9 kg/m^2), overweight (25.0-29.9 kg/m^2), and obese (≥30.0 kg/m^2) (WHO, 2000).

Blood Pressure Measurement: Blood pressure was measured using a calibrated mercury sphygmomanometer (Accoson, England) following standardized protocols (Whelton et al., 2018). Participants rested in a seated position for at least 5 minutes before measurement. Two readings were taken on the right arm with a 2-minute interval, and the average was recorded. Hypertension was classified according to the 2017 American College of Cardiology/American Heart Association (ACC/AHA) guidelines: normal (<120/80 mmHg), elevated (120-129/<80 mmHg), stage 1 hypertension (130-139/80-89 mmHg), and stage 2 hypertension (≥140/≥90 mmHg) (Whelton et al., 2018).

Blood Glucose Assessment: Random blood sugar (RBS) was measured using a glucometer (Accu-Chek Active, Roche Diagnostics, Germany) via finger-prick capillary blood sampling. RBS ≥140 mg/dL (≥7.8 mmol/L) was considered elevated and suggestive of potential diabetes or prediabetes, warranting further fasting blood glucose assessment (American Diabetes Association, 2021).

Malaria Screening: Malaria status was assessed using rapid diagnostic test (RDT) kits (SD BIOLINE Malaria Ag P.f/Pan, Standard Diagnostics Inc., Korea) detecting Plasmodium falciparum histidine-rich protein 2 (HRP-2) and Plasmodium lactate dehydrogenase (pLDH) for pan-malarial species. Tests were performed according to manufacturer instructions using capillary blood samples (WHO, 2015).

Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki principles for medical research involving human subjects (World Medical Association, 2013). Verbal informed consent was obtained from all participants after explaining the study purpose, procedures,

potential benefits, and confidentiality measures. Participants were informed of their right to withdraw at any time without penalty. All data were de-identified and stored securely. Participants with abnormal findings were counselled and referred to appropriate healthcare facilities for further evaluation and management.

Data Management and Statistical Analysis

Data were recorded on standardized case report forms and entered into Microsoft Excel 2019 (Microsoft Corporation, USA). Data cleaning and validation were performed to identify and correct entry errors. Statistical analysis was conducted using IBM SPSS Statistics version 26.0 (IBM Corporation, Armonk, NY, USA).

Descriptive statistics were used to summarize data. Continuous variables (age, weight, height, BMI, blood pressure, RBS) were assessed for normality using the Shapiro-Wilk test and presented as mean ± standard deviation (SD) for normally distributed data or median (interquartile range [IQR]) for non-normally distributed data. Categorical variables (sex, BMI categories, blood pressure categories, malaria status) were presented as frequencies and percentages. Given the descriptive nature and small sample size (n=27), inferential statistics were not performed, and the study focused on prevalence estimation with 95% confidence intervals (CI) calculated using the Wilson score method (Brown et al., 2001).

RESULTS

Table 1: Descriptive Statistics for Continuous Variables

Variable	Mean ± SD	Median	Range	95% CI
Age (years)	36.4 ± 6.2	38.0	20-44	33.9-38.9
Weight (kg)	70.1 ± 17.8	67.0	24-136	63.0-77.2
Height (m)	1.61 ± 0.12	1.59	1.45-1.80	1.56-1.66
BMI (kg/m²)	26.8 ± 6.4	26.9	5.0-51.0	24.3-29.3
Systolic BP (mmHg)	120.0 ± 18.4	120.0	91-162	112.7-127.3
Diastolic BP (mmHg)	76.4 ± 13.5	72.0	56-113	71.0-81.8
RBS (mg/dL)	29.0 ± 7.2	30.0	1.8-51.0	26.2-31.8

Note: One participant (S/N 27) had missing data for weight, height, BMI, systolic BP, and RBS; analysis for these variables was based on n=26.

A total of 27 participants were enrolled in the study, representing 45.0% (27/60) of the eligible staff who attended the health education session. The demographic and clinical characteristics are presented in Table 2.

Table 2: Demographic and Clinical Characteristics of Participants (N=27)

Characteristic	Value
Age (years)	
Mean ± SD	36.4 ± 6.2
Median (IQR)	38.0 (34.0-40.0)

Characteristic	Value
Range	20-44
Age Distribution, n (%)	
20-29 years	4 (14.8%)
30-39 years	14 (51.9%)
40-44 years	9 (33.3%)
Sex, n (%)	
Female	16 (59.3%)
Male	11 (40.7%)
Anthropometric Parameters (n=26)	
Weight (kg), mean ± SD	70.1 ± 17.8
Height (m), mean ± SD	1.61 ± 0.12
BMI (kg/m²), mean ± SD	26.8 ± 6.4
Blood Pressure (n=26)	
Systolic BP (mmHg), mean ± SD	120.0 ± 18.4
Diastolic BP (mmHg), mean ± SD	76.4 ± 13.5
Random Blood Sugar (n=26)	
RBS (mg/dL), mean ± SD	29.0 ± 7.2

The mean age of participants was 36.4 ± 6.2 years (range: 20-44 years), with the majority (51.9%, 14/27) falling within the 30-39 years age group. Female participants comprised 59.3% (16/27) of the sample, while males accounted for 40.7% (11/27), yielding a female-to-male ratio of approximately 1.5:1. This gender distribution is consistent with the increasing participation of women in Nigeria's formal workforce sector (National Bureau of Statistics, 2020).

Prevalence of Cardiometabolic Risk Factors

Table 3: Prevalence of Cardiometabolic Risk Factors and Malaria (N=27)

Risk Factor	n (%)	95% CI
Blood Pressure Status (n=26)		
Normal (<120/80 mmHg)	12 (46.2%)	27.1-66.3%
Elevated (120-129/<80 mmHg)	6 (23.1%)	9.9-43.7%
Stage 1 HTN (130-139/80-89 mmHg)	4 (15.4%)	5.4-34.4%
Stage 2 HTN (≥140/≥90 mmHg)	4 (15.4%)	5.4-34.4%
Hypertension (≥130/80 mmHg)	8 (30.8%)	15.4-50.9%
BMI Categories (n=26)		
Underweight (<18.5 kg/m²)	3 (11.5%)	3.0-30.1%
Normal (18.5-24.9 kg/m²)	17 (65.4%)	45.8-81.1%
Overweight (25.0-29.9 kg/m²)	3 (11.5%)	3.0-30.1%
Obese (≥30.0 kg/m²)	3 (11.5%)	3.0-30.1%
Overweight/Obese (BMI ≥25 kg/m²)	6 (23.1%)	10.0-43.1%
Glycaemic Status (n=26)		
Normal RBS (<140 mg/dL)	24 (92.3%)	74.9-98.8%

Risk Factor	n (%)	95% CI
Elevated RBS (≥140 mg/dL)	2 (7.7%)	1.4-24.2%
Malaria Status (n=27)		
Negative	27 (100%)	87.5-100%
Positive	0 (0%)	0-12.5%

Note: Percentages calculated from available data for each parameter; one participant had missing data for anthropometric and BP measurements.

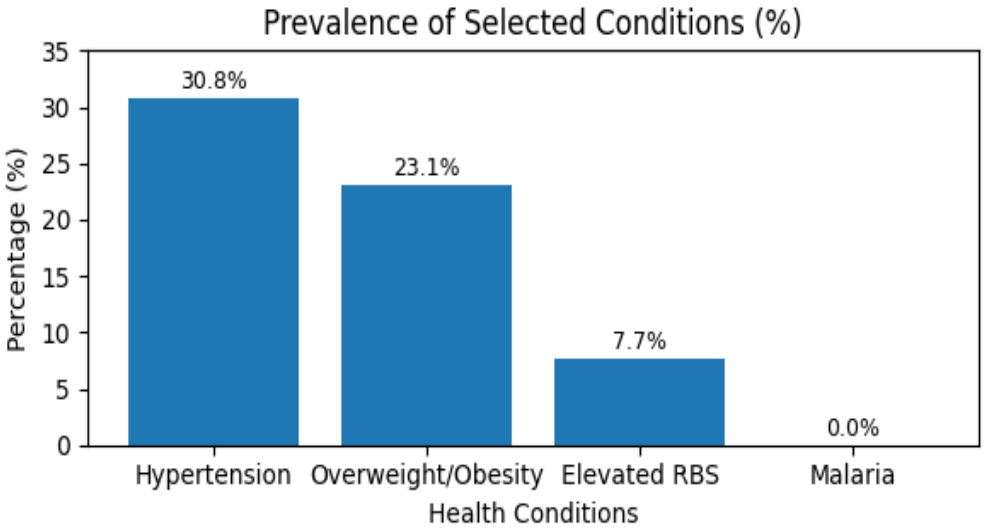


Figure 1: Prevalence of Major Cardiometabolic Risk Factors

Hypertension

Among the 26 participants with complete blood pressure data, 8 individuals (30.8%, 95% CI: 15.4-50.9%) met criteria for hypertension (BP ≥130/80 mmHg) according to 2017 ACC/AHA guidelines (Whelton et al., 2018). Specifically, 4 participants (15.4%) had stage 1 hypertension (130-139/80-89 mmHg), and 4 participants (15.4%) had stage 2 hypertension (≥140/≥90 mmHg). An additional 6 participants (23.1%) had elevated blood pressure (120-129/<80 mmHg), representing a prehypertensive state associated with increased cardiovascular risk (Whelton et al., 2018). Only 12 participants (46.2%) demonstrated normal blood pressure (<120/80 mmHg).

The observed hypertension prevalence of 30.8% in this workplace population aligns with the national prevalence estimate of 28.9% among Nigerian adults (Adeloye et al., 2021), suggesting that federal agency workers experience similar cardiovascular risk burdens as the general population. This finding is particularly concerning given the relatively young mean age (36.4 years) of participants, as hypertension in younger adults is associated with greater lifetime cardiovascular disease risk (Yano et al., 2015).

Obesity and Overweight

Analysis of BMI data (n=26) revealed that 6 participants (23.1%, 95% CI: 10.0-43.1%) were classified as overweight or obese (BMI ≥25 kg/m²). Specifically, 3 participants (11.5%) were overweight (BMI 25.0-29.9 kg/m²), and 3 participants (11.5%) were obese (BMI ≥30.0 kg/m²). The majority (17 participants, 65.4%) had normal BMI (18.5-24.9 kg/m²), while 3 participants (11.5%) were underweight (BMI <18.5 kg/m²).

The observed prevalence of overweight/obesity (23.1%) is lower than the national estimate of approximately 40% for combined overweight and obesity among Nigerian adults (Ogunleye et al., 2021). This discrepancy may reflect selection bias, as health-conscious individuals may have been more likely to volunteer for screening, or may indicate relatively better health status among federal agency workers compared to the general population. However, the presence of obesity in this workforce population underscores the need for workplace wellness programs targeting weight management and physical activity promotion (Anderson et al., 2009).

Notably, 3 participants (11.5%) were underweight, which may reflect either chronic illness, inadequate nutrition, or constitutional factors. Underweight status in adults is associated with increased mortality risk and may indicate underlying health problems requiring medical evaluation (Flegal et al., 2005).

Hyperglycaemia

Among 26 participants with RBS data, 2 individuals (7.7%, 95% CI: 1.4-24.2%) had elevated random blood glucose levels (RBS ≥140 mg/dL), suggestive of potential diabetes or prediabetes. The remaining 24 participants (92.3%) had RBS <140 mg/dL. It is important to note that random blood glucose measurements are less specific than fasting plasma glucose or HbA1c for diabetes diagnosis, and these individuals require confirmatory testing with fasting blood glucose or oral glucose tolerance testing (American Diabetes Association, 2021).

The prevalence of elevated RBS (7.7%) is higher than the national diabetes prevalence estimate of 5.8% (Uloko et al., 2018), though direct comparison is limited by different diagnostic methods. This finding suggests a potential burden of undiagnosed dysglycaemia in this workforce, emphasizing the importance of systematic screening programs.

Malaria

All 27 participants (100%, 95% CI: 87.5-100%) tested negative for malaria by rapid diagnostic testing. The absence of malaria cases in this urban, employed population is consistent with lower malaria transmission intensity in urban areas of Abuja compared to rural settings (Alemu et al., 2011). However, this finding should be interpreted cautiously, given the small sample size and the cross-sectional nature of screening, which captures only point prevalence

Sex-Specific Differences

Table 4: Sex-Specific Distribution of Risk Factors

Parameter	Female (n=16)	Male (n=11)
Mean Age (years)	36.9 ± 5.8	35.6 ± 7.0
Mean BMI (kg/m²)	28.4 ± 7.1	24.4 ± 4.5
Hypertension, n (%)	4/15 (26.7%)	4/11 (36.4%)
Overweight/Obese, n (%)	5/15 (33.3%)	1/11 (9.1%)
Elevated RBS, n (%)	2/15 (13.3%)	0/11 (0%)

Note: Female anthropometric/BP data based on n=15 due to one missing case; male data based on n=11 with complete information.

Female participants demonstrated higher mean BMI (28.4 kg/m² vs. 24.4 kg/m²) and higher prevalence of overweight/obesity (33.3% vs. 9.1%) compared to males. This sex difference is consistent with Nigerian national data showing a higher prevalence of obesity among women (Ogunleye et al., 2021) and may reflect biological, behavioural, and sociocultural factors, including hormonal influences, dietary patterns, physical activity levels, and cultural perceptions of body size (Okop et al., 2016).

Conversely, male participants showed slightly higher hypertension prevalence (36.4% vs. 26.7%), consistent with global patterns of higher hypertension prevalence among men in younger age groups (Everett & Zajacova, 2015). However, given the small sample size, these observed differences should be interpreted cautiously and require confirmation in larger studies with adequate statistical power.

Screening Participation Rate

A critical finding of this study was the low voluntary screening participation rate of 45.0% (27/60) despite (1) prior health education on the importance of screening, (2) provision of free screening services, (3) screening conducted at the workplace during work hours, and (4) no identified structural barriers to participation. This finding indicates substantial gaps in health-seeking behavior and suggests that health education alone is insufficient to motivate screening uptake in this population.

Low screening participation rates have been documented in other Nigerian workplace settings, with barriers including perceived good health status, fear of diagnosis, lack of time, confidentiality concerns, and stigma associated with chronic diseases (Ofili & Ncama, 2016; Iloh et al., 2013). The 55% non-participation rate in this study represents a missed opportunity for early disease detection and prevention, particularly given the high prevalence of risk factors among those who were screened

DISCUSSION

This cross-sectional screening study among federal government agency workers in Abuja, Nigeria, highlights a substantial cardiometabolic disease burden in a relatively young workforce (mean age 36.4 years). Nearly one-third of participants met criteria for

hypertension, close to one-quarter were overweight or obese, and a smaller but important proportion had elevated blood glucose. The absence of malaria cases in this cohort reflects the lower transmission intensity in Abuja's urban setting compared with many rural areas, although this finding should be interpreted cautiously given the modest sample size and the point-prevalence design of the assessment. Beyond the numerical burden of disease, the most striking operational finding was that only 45% of eligible staff took part in voluntary screening despite prior health education and free on-site services, underscoring deep-seated barriers to health-seeking behaviour within the federal civil service.

The high prevalence of hypertension in a relatively young group of civil servants must be understood in the context of occupation-specific risk pathways rather than as an isolated epidemiological figure. Federal government work in Nigeria is characterised by prolonged sedentary office hours, often 8–10 hours daily, with limited opportunities for movement, combined with chronic institutional stressors such as job insecurity despite nominal permanence, bureaucratic pressures, and recurrent concerns about salary delays and career progression (Ugwu, 2011; Kivimäki & Steptoe, 2018). These conditions plausibly sustain neuroendocrine activation, with prolonged cortisol exposure and sympathetic overactivity that elevate blood pressure and promote central adiposity and insulin resistance over time (Kyrou et al., 2006). Within this environment, irregular meal timing, skipped breakfasts, and late-night eating linked to long commutes likely further disrupt metabolic rhythms and intensify cardiometabolic risk.

The nutritional landscape surrounding many federal offices compounds this vulnerability. Limited or poorly functioning staff canteens and short lunch breaks channel workers toward inexpensive, energy-dense street foods and sugar-sweetened beverages available around government complexes. Social practices within the workplace—such as communal celebrations, send-forth parties, and informal gatherings that regularly feature calorie-dense traditional dishes—create an obesogenic micro-environment in which refusing food can be interpreted as antisocial or disrespectful (Akpan et al., 2018; Ogunsina et al., 2017). Abuja's spatial configuration adds a further structural layer: many workers live on the urban periphery and travel two to four hours daily between home and central administrative districts, leaving little time for exercise, adequate sleep, or home-cooked meals (Oyesiku, 2019; Hoehner et al., 2012). For such workers, daily routines often involve leaving home before dawn and returning after dark, effectively crowding out structured physical activity and pushing them towards convenience foods that are quick but of poor nutritional quality.

Within this context, the observed proportion with elevated blood pressure (prehypertension) is particularly important. Individuals with prehypertension are known to have substantially increased risk of progressing to frank hypertension and subsequent cardiovascular disease relative to normotensive peers, making this group a critical target for early lifestyle interventions (Huang et al., 2013). The detection of elevated random blood glucose in nearly one in thirteen participants, in a setting where a large share of diabetes remains undiagnosed, likely represents only the visible portion of a broader metabolic risk profile in this workforce

(International Diabetes Federation, 2021). Taken together, these findings suggest that federal workplaces in Abuja harbour a silent but significant pool of young and middle-aged adults already on the trajectory toward chronic cardiovascular and metabolic disease.

The marked gender disparity in obesity, with substantially higher prevalence among women than men, reflects complex interactions between sociocultural expectations, occupational roles, and domestic responsibilities. In many Nigerian communities, larger female body size is positively framed as a sign of prosperity, fertility, and marital stability, which can generate subtle pressure on women to maintain or tolerate higher body weight (Benkeser et al., 2012; Okop et al., 2016). Weight loss among women may attract concern or speculation about ill health, poverty, or marital problems, reducing social support for weight-control efforts even among those who are medically motivated to lose weight. At the same time, employed women typically shoulder a disproportionate burden of unpaid domestic work—the so-called "second shift", including household tasks, childcare, and meal preparation after formal work hours (Makama, 2013). This double workload compresses the time and energy available for structured exercise or leisure-time physical activity.

Gendered patterns in occupational roles and leisure further reinforce these differences. Within federal agencies, women are often concentrated in lower- to mid-level clerical and administrative positions that involve prolonged sitting and minimal fieldwork, whereas male staff may be more frequently deployed in roles that require site visits, field monitoring, or inter-office mobility (Ordinioha & Brisibe, 2013). Outside office hours, men are more likely to engage in sports or social activities that incorporate physical movement, while women's social engagements often centre on church activities, family gatherings, and other largely sedentary events. These intersecting structural and cultural dynamics help explain the markedly higher obesity prevalence among women and point to the need for gender-sensitive interventions that acknowledge time constraints, social expectations, and unequal access to physical activity opportunities.

Interestingly, the study also identified a non-trivial proportion of underweight participants, even within a formally employed population. Underweight status in adults is associated with increased mortality and may be a marker of chronic illness, food insecurity, high energy expenditure without commensurate intake, or disordered eating patterns (Flegal et al., 2005). In this setting, the coexistence of obesity, underweight, and cardiometabolic abnormalities within the same workforce underscores the "double burden" of malnutrition and supports the need for a nuanced approach to workplace health that goes beyond a narrow focus on obesity alone.

The detection of elevated random blood glucose among a notable minority of participants, in a context where most diabetes is undiagnosed, reinforces the crucial role of workplaces as platforms for early identification of metabolic disease. Chronic stress, sedentary work, and high-glycaemic diets that are common in urban Nigerian office settings jointly create conditions favouring insulin resistance and eventual type 2 diabetes (Kyrou et al., 2006). Given that a high proportion of diabetes in sub-Saharan Africa remains undiagnosed until

complications emerge, opportunistic screening in settings like federal ministries and agencies offers a pragmatic strategy to identify individuals at risk and to link them to care (International Diabetes Federation, 2021). Comparable prevalence estimates among other professional groups, such as bank workers in Lagos, further support the notion that structured workplace screening can detect significant metabolic risk in seemingly healthy, economically active adults (Ogunsina et al., 2017).

The absence of malaria in this cohort, although consistent with lower urban transmission in Abuja relative to many rural regions, also illustrates the shifting disease profile among urban civil servants. While infectious diseases remain important nationally, the daily health risks faced by this workforce appear increasingly dominated by non-communicable diseases (Alemu et al., 2011; National Malaria Elimination Programme, 2021). This epidemiological pattern reinforces arguments for rebalancing occupational health services away from a narrow pre-employment focus towards continuous surveillance and prevention of chronic conditions.

The most operationally significant finding in this study is the low participation rate in voluntary screening, despite the absence of direct costs to workers and prior health education efforts. This pattern reveals a profound misalignment between the availability of services and actual engagement, rooted in workplace culture, trust dynamics, and structural barriers rather than simple knowledge deficits. In many Nigerian institutions, visible health-seeking behaviour is subtly coded as weakness or unreliability, and employees may fear that documented diagnoses will negatively affect promotion prospects, access to desirable postings, or perceived suitability for high-responsibility roles (Isah & Okojie, 2006). In highly hierarchical bureaucracies where informal evaluations and patronage can override formal protections, workers may rationally judge that the career risks of having a documented chronic condition outweigh the perceived benefits of early detection.

Past organisational experiences and broader national history likely reinforce this caution. Stories of colleagues who disclosed health problems and subsequently lost coveted responsibilities or were quietly reassigned can circulate as cautionary tales, amplifying reluctance to participate in health checks conducted within the employer's premises. More broadly, historical episodes of ethical breach in medical research and service delivery in Nigeria, such as the widely publicised Trovan trial in Kano, have contributed to a persistent undercurrent of mistrust regarding institutional health initiatives (Abdullahi, 2009). In such a climate, questions about data confidentiality, the ultimate use of screening results, and the possibility of hidden agendas are not merely speculative but form a rational risk calculation for workers who feel structurally vulnerable.

Perceived invulnerability among relatively young adults likely contributed further to low uptake. Many staff in their 30s and early 40s may view hypertension and diabetes as "old people's diseases" and therefore not personally salient, especially in the absence of obvious symptoms. Psychological constructs such as optimism bias and present-focused decision-making, heightened by economic uncertainty and competing daily demands, make it difficult for asymptomatic individuals to prioritize screening that promises benefits only in the distant

future (Chapman & Coups, 2006). Time pressures also play a role: even when screening is technically offered during work hours, employees juggling heavy workloads, looming deadlines, and long commutes may perceive participation as an additional burden rather than a convenience (Robroek et al., 2009). Gender norms can further discourage participation, with some constructions of masculinity framing health checks as unmanly, and women facing the added constraint that any time taken for personal health during work hours diminishes the limited time remaining for domestic responsibilities (Yousaf et al., 2015).

These findings have several practical implications for improving uptake of workplace screening. Voluntary, opportunistic models may be insufficient in environments where fear, mistrust, and opportunity costs are high. More structured approaches, such as mandatory periodic examinations coupled with robust confidentiality safeguards and clear separation between occupational health records and performance appraisal, may be needed to normalise participation and reduce fears of discrimination (Tsutsumi, 2015; Ofili & Ncama, 2016). Incentives, such as linking participation to wellness credits or reduced insurance premiums, and leveraging peer influence through health champions and team-based goals, could further shift social norms (Christakis & Fowler, 2007; Mattke et al., 2013). Importantly, communication strategies must directly address identified concerns, using transparent messaging about data protection and clear articulation of how screening results will and will not be used.

Study Strengths and Limitations

This study provides novel data on an understudied population using standardized protocols for multiple risk factors, with direct policy relevance and findings consistent with national trends. However, limitations include: the use of convenience sampling and its implications for selection bias and generalizability, small sample size, limiting statistical power; 45% participation rate introducing potential selection bias; use of random blood glucose rather than fasting glucose or HbA1c limiting definitive diabetes diagnosis; single-occasion blood pressure measurements potentially including transient elevations; cross-sectional design precluding longitudinal assessment; single-site location limiting generalizability; absence of data on dietary patterns, physical activity, smoking, and family history; and lack of systematic data on reasons for non-participation.

Public Health, Policy, and Research Implications

This study adds to the growing evidence that urban Nigerian workplaces are critical sites for early detection and prevention of non-communicable diseases. The combination of high hypertension prevalence, significant metabolic risk, gendered obesity patterns, and low screening uptake points to the need for a comprehensive overhaul of occupational health services in the federal civil service. Current practice, which often limits assessment to pre-employment examinations, misses opportunities to identify emerging NCDs and to intervene early (Isah & Okojie, 2006; Onyemaechi et al., 2016). Policy responses should move towards

institutionalising regular health surveillance, at least annually or biennially, integrating blood pressure measurement, anthropometry, blood glucose, and, where feasible, lipid profiling as routine components of employment-related health care (International Labour Organization, 2013; WHO, 2007). Parallel investments in workplace infrastructure, healthy cafeteria options, opportunities for physical activity, smoke-free environments, and stress-reduction initiatives are essential to support individual behaviour change and to modify the underlying obesogenic and diabetogenic environment (Anderson et al., 2009; WHO, 2007).

At a broader systems level, strengthening linkages between workplace screening and the national health insurance framework could facilitate continuity of care for detected conditions, including subsidised treatment, counselling, and adherence support (Gaziano et al., 2015; Onoka et al., 2015). Future research should build on these findings through larger, multi-site surveys that capture diverse federal institutions, longitudinal cohorts to track incidence and outcomes, and qualitative work to deepen understanding of non-participants' perspectives and concerns. Randomised and implementation-focused studies assessing the effectiveness, acceptability, and cost-effectiveness of different workplace intervention models, including tailored, gender-sensitive programmes and context-specific behaviour change strategies, would provide much-needed evidence to guide scale-up in resource-constrained settings.

CONCLUSION

This study revealed substantial cardiometabolic disease burden among federal agency workers in Abuja, with 30.8% demonstrating hypertension, 23.1% overweight/obese, and 7.7% with elevated blood glucose in a relatively young workforce (mean age 36.4 years). The low voluntary screening participation rate (45%) despite health education and free services underscores the insufficiency of education-only approaches and highlights barriers, including perceived low risk, fear of diagnosis, time constraints, confidentiality concerns, and limited health literacy.

These findings support urgent policy actions: mandatory periodic health screening for federal workers; substantial investment in occupational health infrastructure and personnel; integration of comprehensive NCD screening, prevention, and management into occupational health protocols; evidence-based workplace wellness programs; expanded health insurance coverage; and systematic approaches addressing screening participation barriers through incentivization, enhanced communication, and health literacy improvement.

Future research should include larger multi-site studies, longitudinal cohorts, qualitative barrier explorations, intervention trials, and cost-effectiveness analyses. Given documented gene-diet-lifestyle interactions influencing cardiometabolic disease risk (Adekola, 2025), precision approaches integrating genetic risk assessment with tailored behavioural interventions may optimize workplace NCD prevention.

Workplace health programs represent critical but underutilized opportunities for addressing Nigeria's rising NCD burden. The convergence of accessible populations, existing infrastructures, and clear return-on-investment justifications makes workplace settings ideal

for comprehensive health promotion. Translating these findings into actionable policies has the potential to improve health outcomes for millions of Nigerian federal workers while contributing to national NCD control efforts.

DECLARATIONS

Ethics Approval and Consent to Participate

This study was conducted in accordance with the Declaration of Helsinki principles for medical research involving human subjects. Verbal informed consent was obtained from all participants after explaining the study purpose, procedures, potential benefits, and confidentiality measures. Participants were informed of their right to withdraw at any time without penalty. The study involved minimal risk, as it comprised health education and routine non-invasive screening procedures. Retrospective ethics approval for data publication may be sought from the University of Abuja Health Research Ethics Committee.

Declaration of Generative AI And AI-Assisted Technologies in the Writing Process

During the creation of this paper, the authors utilized Claude AI to gather additional information and Co-Pilot to generate images. After utilizing this tool/service, the authors examined and edited the text as needed, and they accept full responsibility for the publication's contents.

Consent for Publication

All data presented in this manuscript are de-identified and aggregated, with no individual participant identifiable. Participants were informed during consent that anonymized group-level results might be published for scientific and public health purposes.

Availability of Data and Materials

The de-identified dataset supporting the conclusions of this article is available from the corresponding author upon reasonable request and subject to appropriate data-sharing agreements ensuring participant confidentiality.

Competing Interests

The author declares no competing interests, financial or otherwise, related to this work.

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Authors' Contributions

SAA, KTM, MUB, ASA, AAA, YMR, CJI: Conceptualization, study design, health education

delivery, data collection, data analysis, manuscript writing, critical revision, and final approval. The authors had read and agreed to the published version of the manuscript.

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