BJMS
www.batnajms.net

Batna Journal of Medical Sciences 2025;12(4):12
https://doi.org/10.48087/BJMSoa.2025.12412

ORIGINAL ARTICLE

Scoping Review of the Economics of Cardiovascular Disease and the Role of Exercise in Nigeria

Rafiu O OKUNEYE[1], Abdulkareem B TAIWO[1], Fatai A APALARA[1], Rofiat. O DAUDA-OLAJIDE[2], Halimat, I. ISMAIL-ORIRE[3], Emmanuel OGA[4], Lyilola EYITAYO[5]

ABSTRACT

Background: Cardiovascular diseases (CVDs) are the leading cause of death globally and a significant driver of healthcare costs in Nigeria. Despite being preventable, CVDs continue to impose economic hardship on households and threaten national development, particularly due to the underutilization of regular physical activity as a cost-effective prevention strategy. **Objective:** This scoping review maps and synthesizes existing literature on the economic burden of CVDs in Nigeria and evaluates the role of regular exercise in reducing disease prevalence and healthcare expenditure. **Methods:** The review followed the PRISMA-ScR guidelines and included studies published between 2010 and 2025. A total of 64 records were identified; after duplicates were removed and titles/abstracts were screened, 42 full texts were assessed. Of these, 12 studies met the inclusion criteria and were analyzed. Data on healthcare costs, physical activity prevalence, and intervention outcomes were extracted and synthesized narratively. **Results:** Studies reported high out-of-pocket expenditure for CVD care, with annual costs per patient ranging from ₦95,100 ($486) for stroke to ₦421,596 ($1,164) for outpatient heart disease treatment. National estimates suggest that chronic disease costs exceed $100 billion annually. Meanwhile, physical inactivity affects approximately 27% of adults, with lower activity levels linked to higher BMI and blood pressure. Exercise was consistently associated with improved cardiovascular outcomes and reduced treatment costs. **Conclusion:** The dual burden of high CVD-related expenditures and low physical activity levels in Nigeria emphasizes the urgent need for national strategies promoting exercise as a preventive and cost-saving intervention.

Keywords: Health policy, Behavioural intervention, Out-of-pocket expenditure, Disease prevention, Risk factors.

1. Department of Human Kinetics, Sports and Health Education, Lagos State University, Ojo, Lagos, Nigeria. 2. Department of Human Kinetics, Faculty of Education, University of Ilorin, Ilorin, Nigeria. 3. Kwara State University, Malete – Nigeria 4. Department of Human Kinetics and Health Education, University of Cross Rivers State, Nigeria. 5. Department of Human Kinetics and Health Education, University of Ibadan, Nigeria.

Received: 28 Sep 2025
Accepted: 31 Oct 2025

Correspondance to: Abdulkareem TAIWO
E-mail : erudite1434@gmail.com

1. INTRODUCTION

Cardiovascular diseases have been widely acknowledged as the leading cause of global morbidity and mortality. In 2019, the World Health Organisation estimated 17.9 million people died from CVDs, accounting for approximately 32% of all global deaths. Most of these deaths occur in low- and middle-income countries like Nigeria. They are largely linked to modifiable risk factors such as unhealthy diets, tobacco use, and physical inactivity [1,2]

In Nigeria, non-communicable diseases account for approximately 29% of all deaths, with CVDs constituting the largest portion [3]. Studies have shown that there is a steady progression in the prevalence of cardiovascular diseases in Nigeria, and it also accounts for

a large percentage of all deaths from non-communicable diseases. For instance, [4] the estimate that one in four healthy Nigerians was at risk of developing coronary heart disease. Conversely, national statistics reveal that the proportion of deaths due to CVD rose from about 8% in 2010 to 11% in 2022, reflecting an upward trend driven by rapid urbanisation and lifestyle shifts [5] Lifestyle changes such as increasing obesity rates and declining physical activity, among others, have been identified as the major determinants of CVD incidence [4,5]. The economic burden of CVD in Nigeria is enormous, as the healthcare costs associated with cardiovascular diseases are often catastrophic relative to national income levels. A prospective study by [6] in Abeokuta found the annual cost of managing heart failure was approximately ₦319,200 (US$2,128) per patient; this compares starkly with the national minimum wage of ₦70,000 (US$120) per month, and most of these expenses were paid out-of-pocket by patients Similarly, a multi-centre cross-sectional survey of CVD patients in Ibadan reported an average annual outpatient cost of ₦421,596 (US$1,164) and a per-hospitalisation cost of ₦182,302 (US$503). These findings show that even routine CVD care imposes a heavy financial burden on Nigerian households [7]. Furthermore, [8] found that the total cost of care for the first 36 weeks following a stroke averaged ₦95,100 (US$486) per patient. This shows that even stroke care is similarly unaffordable. On a national scale, chronic diseases, such as hypertension, diabetes, and cancer, have been estimated to cost Nigeria over US$45 billion in direct expenditures and more than US$100 billion in indirect costs annually [9]. Globally, CVD results in billions of dollars in annual health expenditures and productivity losses [10]. Taken together, these figures emphasised an urgent need to reduce CVD incidence in Nigeria to mitigate its economic toll.

Regular physical activity is a key preventive strategy for cardiovascular diseases, but remains underutilised in Nigeria. Physical inactivity is a major modifiable risk factor for CVDs [2]. Global guidelines recommend that adults engage in at least 150 minutes of moderate-intensity exercise per week, but only a minority of Nigerians meet this target [11]. National estimates indicate that roughly 27% of adults are physically inactive [12], while a study among young adults found that 71.4% had poor exercise habits [5]. In a multi-centre cohort study of diabetic patients in Northern Nigeria, only 43% achieved ≥150 minutes of exercise per week, and those who did had significantly lower blood pressure [13]. Conversely, higher levels of physical activity have consistently been linked to more favourable cardiovascular risk profiles. For instance, a study conducted in Maiduguri found that adults averaged just 116 minutes of moderate-to-vigorous activity per week, and those with higher activity levels had lower BMI and blood pressure [14]. Large trials conducted in sub-Saharan Africa have further confirmed that aerobic exercise significantly reduces blood pressure among hypertensive patients [15]. Given the high cost of treating CVDs, promoting regular exercise is a cost-effective strategy that can both prevent disease and reduce long-term healthcare expenditures [16, 10, 15].

To date, no previous review has jointly addressed the economic burden of CVDs and the preventive potential of regular exercise in Nigeria. This scoping review seeks to fill that gap by mapping and synthesising the literature on these interrelated issues, thereby informing policy and programmatic interventions aimed at reducing both disease prevalence and healthcare costs in Nigeria.

2. METHODS

This scoping review was guided by the PRISMA-ScR framework and followed a transparent, reproducible methodology to identify, select, and synthesise relevant literature on the economic burden of CVDs in Nigeria and the role of regular physical activity in prevention.

Eligibility Criteria

To be included in this review, studies had to meet the following criteria: they must have been published between 2010 and 2025, focused either on Nigeria or the broader sub-Saharan African region, and addressed at least one of the two core concepts: (1) the economic burden of CVDs or (2) the role of physical activity in CVD prevention. Eligible studies were required to be available in English and could consist of peer-reviewed journal articles or grey literature, such as technical reports, policy briefs, and conference papers from reputable institutions, including government agencies and non-governmental organisations (NGOs).

Information Sources

Literature searches were conducted between June and July 2025 using a wide array of electronic databases. These included PubMed/Medline, Scopus, Google Scholar, African Journals Online, Web of Science, and Global Health. To ensure a comprehensive capture of relevant but non-indexed evidence, grey literature were sourced from institutional websites such as the World Health Organisation, the World Heart Federation, and the Nigerian Federal Ministry of Health.

Search Strategy

The search strategy was developed to identify studies that addressed both cardiovascular disease burden and physical activity. Key search terms were used in various combinations, such as “cardiovascular disease”, “heart disease”, “hypertension”, and “stroke”; these were paired with economic terms like “economic burden”, “cost”, “out-of-pocket”, and “health expenditure”. For the prevention

aspect, terms like “exercise”, “physical activity”, “aerobic”, and “prevention” were added. Geographic filters included the terms “Nigeria” and “Africa”. Boolean operators (AND, OR) were used to refine and expand the searches where appropriate.

Selection Process

A two-stage screening approach was employed. First, titles and abstracts of all retrieved studies were screened independently by two reviewers. Studies that met the inclusion criteria during this initial screening were retrieved in full for further evaluation. Discrepancies between the reviewers during either phase were resolved through discussion until consensus was reached. Only studies that fulfilled all eligibility criteria were included in the final synthesis.

Data Charting

Data from the included studies were extracted using a standardised charting form. The variables collected included: the author(s) and year of publication, study title, design and setting, population characteristics, and geographic location. The primary outcome measures recorded were economic cost data (including both direct and indirect costs), physical activity levels, and the impact of exercise interventions where applicable. Extracted data were then organised thematically and synthesised narratively in alignment with the two guiding questions of the review: (1) the extent of the economic burden posed by CVDs in Nigeria, and (2) the effectiveness and relevance of regular physical activity in CVD prevention and cost reduction.

PRISMA Flowchart

A PRISMA-ScR flowchart was constructed to document the article selection process. In total, 64 records were identified through database searches, with an additional 18 records through grey literature sources. After removing the 10 duplicates, 72 titles and abstracts were screened, yielding 42 full texts for detailed assessment. Of these, 12 met all inclusion criteria and were included in the final synthesis. The flowchart (Figure 1) represents each stage, identification, screening, eligibility, and inclusion, with corresponding record counts and reasons for exclusion at the full-text stage.

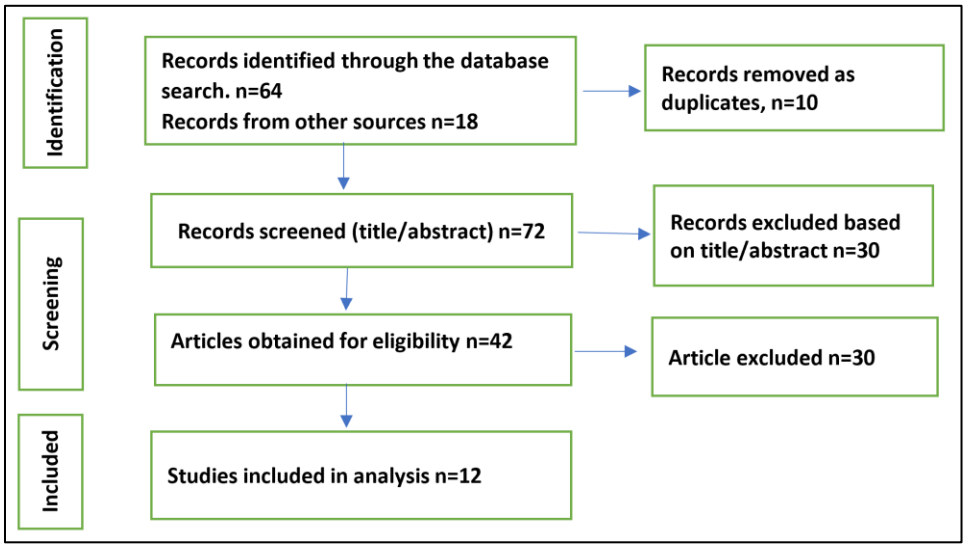

Figure 1. PRISMA Chart flow.

Quality Appraisal

We conducted a basic methodological appraisal to assess study rigour. Each included article was evaluated on three domains: (1) clarity of economic or physical-activity outcome definitions, (2) appropriateness of study design for the stated objectives, and (3) transparency of cost calculation or activity measurement methods. Studies were rated as “high,” “moderate,” or “low” clarity in each domain, and no studies were excluded on quality grounds; instead, appraisal results were used to highlight areas where future work should strengthen methodology.

Grey Literature Search Strategy

To capture non-indexed evidence, we hand-searched the websites of the World Health Organisation, World Heart Federation, Nigerian Federal Ministry of Health, and key NGOs between 1 June and 15 July 2025. On each site, we navigated to sections on cardiovascular health or noncommunicable diseases and downloaded policy briefs, technical reports, and situation analyses relevant to CVD costs or physical activity. All grey literature records were logged with source, title, and retrieval date.

3. RESULTS

The search identified numerous studies on CVD costs and physical activity in Nigeria. Table 1 summarises studies that quantified CVD healthcare costs or economic burden in Nigeria. Table 2 summarises studies on physical activity levels and exercise effects related to CVD risk in Nigeria.

Table 1 shows that CVD care costs are large. For example, Ogah et al. found that heart failure care costs averaged about ₦319,200 ($2,128) per patient per year. Adeniji et al. similarly reported hundreds of thousands of naira per patient-year for outpatient CVD treatment. These values align with broader data: billions of USD are lost globally and in Africa to CVD treatment costs. Hendriks et al. estimated US$144 per patient-year to provide guideline-recommended CVD prevention care in rural clinics. Such figures underscore a substantial financial burden on patients and the health system.

Table 1. Studies quantifying the economic cost of CVD in Nigeria.

Study (Year)	Design & Setting	Main Findings
[6]	Prospective registry; tertiary hospital (Abeokuta, SW Nigeria)	Mean age 58y; Total HF care cost: ₦76,288,845 (₦319,200 = $2,128 per patient per year). Inpatient care was 46% of the total cost. Most spending was out-of-pocket.
[8]	Cross-sectional; multi-centre (public & private hospitals, Ibadan, SW Nigeria)	744 CVD patients (mostly hypertensive HF); Annual OOP costs: mean direct outpatient ₦421,596 (~$1,164), indirect outpatient ₦19,147 ($53). Per-hospitalisation: direct ₦182,302 ($503), indirect ₦14,701 ($41). High OOP payments imposed a heavy burden on households.
[17]	Retrospective case-series; tertiary hospitals (Port Harcourt, Benin City, Lagos, Nigeria)	240 stroke patients (post-stroke hemiplegia). Acute + rehab cost: average ₦95,100 (~$486) per patient for up to 36 weeks of care. Conclusion: Stroke care cost is "huge and unaffordable" for typical Nigerian patients.
[19]	National modelling (Nigeria)	Economic model of chronic diseases (diabetes, CVD, cancer): Annual cost: ~$45 billion direct, >$100 billion indirect. Key drivers: high disease prevalence, healthcare utilisation, and behavioural risk factors. Urges investment in prevention and access to care.
[20]	Micro-costing (primary care clinic, Kwara State, Nigeria)	Estimated CVD prevention care cost: US$144 per patient-year (direct $82, indirect $62). Hypertension care alone costs ~$118, diabetes $263 per patient-year. The main cost drivers were drugs and tests. Scenario modelling showed that task-shifting and fewer visits could cut direct costs by ~42%.

HF-Heart failure, OOP-out-of-pocket

Table 2 shows widespread physical inactivity and its consequences. Both general-population and patient cohorts report low exercise rates. Notably, only 43–50% of surveyed Nigerians exercise regularly. In contrast, those who do exercise tend to have healthier profiles, for example, diabetics who met exercise guidelines had lower systolic BP, and active workers had lower BMI and blood pressure. These results are consistent with global evidence that routine aerobic exercise substantially lowers blood pressure and CVD risk.

4. DISCUSSION

This scoping review provides a consolidated synthesis of the available literature on the economic burden of CVDs in Nigeria and the potential of regular exercise in mitigating both disease risk and long-term health expenditures. The findings confirm that CVDs pose a significant and escalating public health and economic challenge in Nigeria, with direct and indirect costs that are both catastrophic for households and unsustainable for the broader health system. At the same time, regular physical activity remains a widely underutilised yet demonstrably effective preventive strategy.

Studies consistently report high out-of-pocket expenditures for CVD care in Nigeria. [6] found that heart failure treatment in Abeokuta averaged ₦319,200 (US$2,128) annually per patient, while the minimum wage was only ₦72,000 per month, illustrating a severe mismatch between household incomes and care costs. [7] further stated that patients in Ibadan bore average outpatient costs of

₦421,596 (US$1,164) and inpatient costs of ₦182,302 (US$503) annually, reaffirming that even standard care is financially burdensome. These findings are corroborated by [17] who reported that stroke management in tertiary facilities required nearly ₦95,100 (US$486) over just 36 weeks, an amount unaffordable for most Nigerians. These costs are overwhelmingly financed through out-of-pocket payments due to weak health insurance coverage and poor risk-pooling mechanisms. Consequently, CVD care often leads to catastrophic health spending and medical impoverishment.

Table 2. Selected studies on physical activity, exercise habits, and CVD risk in Nigeria.

Study(Year)	Population/Design	Main Findings
[5]	Cross-sectional survey; young adults (18–35y, Delta State)	294 respondents; 71.4% reported no regular exercise. Heart-unhealthy behaviours (poor diet, smoking) were also common. The study concluded that a sedentary lifestyle is rampant among Nigerian youth.
[14]	Cross-sectional; employed adults (Maiduguri, NE Nigeria)	292 workers; mean MVPA = 116 min/week (below the 150-min guideline). Women were less active. Health-enhancing activity is inversely correlated with BMI and blood pressure. Authors suggest workplace activity promotion to prevent CVD.
[13]	Cross-sectional; adults with diabetes (multicenter, northern Nigeria)	426 diabetic patients; only 43% achieved ≥150 min/week of exercise. Those who exercised adequately had significantly lower systolic BP compared to inactive patients. Knowledge of exercise benefits was low, indicating a need for education.
[12]	Program costing (HEARTS hypertension program)	Cited national risk factor data: physical inactivity prevalence ~27.1% in Nigeria. Also reported average hypertension treatment cost ($24/patient) and noted that workforce/task-shifting could improve efficiency.
[1]	Global/Nigeria estimates	Globally, 17.9M CVD deaths in 2019 (32% of deaths). WHO emphasises that regular physical activity (≥150 min of moderate exercise weekly) can dramatically reduce CVD risk. However, in many countries, <30%) adhere to these guidelines.
[21]	Pretest–posttest control-group design (10-15y, Lagos State)	50 prehypertensive adolescents, Significant reductions in resting heart rate blood glucose and BMI, no change in systolic and diastolic blood pressure
[22]	Cross-sectional survey; “religious conservatives” (strict dress codes: hijab, full-face cover, nuns)	287 adult females, poor exercise engagement: 46% never exercised; only 26.8% exercised 1–2×/week, 10.8% daily. Good knowledge of benefits in 68.5%, yet barriers were: body-exposure concerns (40.1%), laziness (32.9%), tight schedule (17.9%), lack of interest (9.1%). Author recommended female-only exercise groups, indoor/loose-clothing workouts, and religious-leader advocacy to improve uptake

MVPA- Moderate to vigorous Intensity Physical Activity, BP – Blood pressure

At the national level, the broader economic impact of CVDs and other chronic diseases is staggering. Modelling studies estimate that Nigeria loses over US$45 billion annually in direct healthcare costs and more than US$100 billion in lost productivity due to noncommunicable diseases, including CVD [18] Such figures not only reflect the growing clinical burden of chronic conditions but also suggest a threat to national economic development, given the disproportionate effect on the working-age population. Moreover, evidence from cost-effectiveness evaluations like [19] demonstrates that even basic preventive care in primary settings, such as blood pressure control via task-shifting, can be delivered for as little as US$144 per patient per year, significantly less than the cost of treating established heart disease.

Despite the economic and health imperatives, preventive strategies such as physical activity remain insufficiently promoted or practised across Nigeria. Physical inactivity is well-established as a key risk factor for CVD and other noncommunicable diseases [1] However, national-level data indicate that nearly 27% of Nigerians are physically inactive [12], and subnational studies suggest even lower levels of adherence to global recommendations. [5] reported that 71.4% of young adults in Delta State had no regular exercise routine. Similarly, [14] documented that the average moderate-to-vigorous physical activity of adults in Maiduguri is 116 minutes of per week, which is below the 150 minutes/week recommended by WHO. Notably, increased physical activity in this cohort was associated with lower BMI and blood pressure, indicating a direct relationship between exercise and cardiovascular risk modulation.

The benefits of physical activity are also apparent in clinical populations. [13] found that only 43% of diabetic patients in Northern Nigeria achieved the recommended physical activity threshold, yet those who did exhibited significantly lower blood pressure. These findings are consistent with trials across sub-Saharan Africa, which demonstrate that aerobic exercise interventions substantially improve cardiometabolic outcomes, including blood pressure and lipid profiles [15] Importantly, these improvements are not only clinically significant but also economically beneficial: exercise-based prevention delays disease onset and reduces the need for costly pharmacological and surgical interventions.

This review has several limitations that should be acknowledged. First, we restricted our search to studies published in English, which may have excluded relevant research conducted or reported in other languages. Second, despite systematic efforts to identify grey literature, including hand-searching institutional websites and consulting experts, some non-indexed reports or unpublished data may

have been overlooked. Third, the heterogeneity of study designs and cost-reporting methods precluded formal meta-analysis, and variations in currency valuation years limited precise cross-study comparisons.

5. Conclusion

This scoping review identified the dual challenge Nigeria faces with the growing economic burden of CVDs and the persistent underutilisation of regular physical activity as a preventive strategy. Evidence from multiple studies confirms that the direct and indirect costs of managing CVDs are catastrophic for individuals and unsustainable for the health system. Simultaneously, physical inactivity remains prevalent, despite widespread evidence demonstrating its protective effects against cardiovascular morbidity and its potential to lower healthcare expenditures. The current evidence base supports the urgent need for national strategies that prioritise physical activity promotion as a cost-effective, population-level intervention. Future research should focus on integrating economic modelling with implementation science to evaluate scalable exercise-based interventions within the Nigerian context.

Contribution to Knowledge

This scoping review makes several critical contributions to the existing body of knowledge at the intersection of cardiovascular health, economic burden, and preventive strategies in Nigeria. First, it offers the first integrated synthesis of studies examining both the economic burden of CVDs and the preventive role of physical activity within Nigeria and comparable African settings. While prior research has often explored these issues in isolation, this review presents a comprehensive framework for understanding how the financial and epidemiological dimensions of CVDs intersect, thus providing a more holistic basis for public health planning.

Second, this review quantifies the economic strain borne by Nigerian households and identifies critical gaps in health financing by documenting the actual out-of-pocket expenditures associated with conditions such as heart failure, stroke, and hypertension. These data not only fill empirical voids in local health economics but also serve as a foundation for modelling future health policy and insurance reforms aimed at reducing catastrophic health expenditure and improving access to care.

Third, the review compiles verifiable evidence on physical activity levels among Nigerians, revealing widespread inactivity and its strong association with modifiable CVD risk factors. This adds nuance to global physical activity surveillance by contextualising physical inactivity within local socioeconomic, cultural, and environmental constraints. Moreover, it supports the argument that low-cost, lifestyle-based interventions such as exercise promotion could be a cost-effective strategy for reducing the burden of chronic diseases in a struggling economy like Nigeria.

This review also bridges a critical gap in the literature by linking economic and behavioural dimensions of CVD prevention, offering a strategic roadmap for researchers, policymakers, and health educators seeking to reduce cardiovascular morbidity and financial vulnerability through sustainable, population-based interventions.

Competing interests: The authors declare that they have no competing interest.

Funding: This research received no external funding.

REFERENCES

1. World Health Organization. Cardiovascular diseases (CVDs) [Internet]. Geneva: WHO; 2021 Jun 11 [cited 2021 Jun 11]. Available from: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)
2. World Health Organization. Physical activity [Internet]. Geneva: WHO; 2021 [cited 2021]. Available from: https://www.who.int/news-room/fact-sheets/detail/physical-activity
3. World Heart Federation. Cardiovascular disease in Nigeria [Internet]. Geneva: World Heart Federation; 2021 [cited 2021]. Available from: https://world-heart-federation.org
4. World Heart Federation. Risk factors and urbanization [Internet]. Geneva: World Heart Federation; 2021 [cited 2021]. Available from: https://world-heart-federation.org
5. Umuerri EM. Heart disease: Lifestyle, knowledge, and perception among young Nigerian adults. Int J Cardiovasc Acad. 2019;5(4):134-40. doi: 10.4103/IJCA.IJCA_28_19
6. Ogah OS, Stewart S, Onwujekwe OE, Falase AO, Adebayo SO, Olunuga T, et al. Economic burden of heart failure: investigating outpatient and inpatient costs in Abeokuta, Southwest Nigeria. PLoS One. 2014;9(11):e113032. doi: 10.1371/journal.pone.0113032

7. Adeniyi A. Burden of out-of-pocket payments among patients with cardiovascular disease in public and private hospitals in Ibadan, South-West Nigeria: a cross-sectional study. BMJ Open. 2021;11(11):e044044. doi: 10.1136/bmjopen-2020-044044
8. Adeniji RE, Idowu AI, Sambo AB. Economic burden of heart failure in Nigeria. Niger J Hum Mov Wellness Leis Sports. 2021;4:34-45.
9. Yusuf JA, Ibrahim HV, Kolo HG, Olalere VM. An evaluation of the economic burden of chronic diseases in Nigeria. J Med Sci Biol Chem. 2025;2(1):75-83. doi: 10.69739/jmsbc.v2i1.138
10. Akumiah FK, Yakubu AS, Ahadzi D, Tuglo LS, Mishra S, Mohapatra RK, et al. Cardiovascular care in Africa—cost crisis and the urgent need for contextual health service solutions. Glob Heart. 2023;18(1):47. doi: 10.5334/gh.1259
11. Taiwo AB, Apalara FA, Okuneye RO. School-based physical activities: intervention for enhancing students' academic performance in Lagos State. Niger J Hum Mov Wellness Leis Sports. 2023;4:96-102.
12. Sambo EN, Husain MJ, Basu S, et al. Analysis of costs in implementing the HEARTS hypertension program in Nigerian primary care. Cost Eff Resour Alloc. 2025;23:20. doi: 10.1186/s12962-025-00626-8
13. Alkali NH, Uloko AE, Chiroma I, Mugana A, Garba MA, Okpe IO, et al. Cardiovascular risk awareness, exercise practices and metabolic outcomes among patients with diabetes mellitus in Northern Nigeria: a cross-sectional, multicentre study. Niger Postgrad Med J. 2024;31(2):139-46. doi: 10.4103/npmj.npmj_54_24
14. Oyeyemi AL, Adeyemi O. Relationship of physical activity to cardiovascular risk factors in an urban population of Nigerian adults. Arch Public Health. 2013;71(1):6. doi: 10.1186/0778-7367-71-6
15. Ajiboye SK, Oladunjoye AO, Bello AA. Aerobic training and blood pressure control among hypertensive patients: a meta-analysis of randomised controlled trials in sub-Saharan Africa. Front Physiol. 2023;14:1173227. doi: 10.3389/fphys.2023.1173227
16. Taiwo AB, et al. [Information incomplète - titre et détails de publication manquants]. 2024.
17. Birabi BN, Oke KI, Dienye PO, Okafor C. Cost burden of post stroke condition in Nigeria: a pilot study. Glob J Health Sci. 2012;4(6):17-24. doi: 10.5539/gjhs.v4n6p17
18. Hendriks ME, Wit FWNM, Roos MTL, Brewster LM, Akande TM, De Beer IH, et al. Hypertension in sub-Saharan Africa: cross-sectional surveys in four rural and urban communities. PLoS One. 2015;10(3):e0118039. doi: 10.1371/journal.pone.0118039
19. Taiwo AB, Apalara FA, Okuneye RO. Effect of aerobic exercise on selected cardiometabolic risk factors of prehypertensive adolescents in Lagos State. J Niger Assoc Phys Health Educ Recreat Sports Dance. 2022;2(1):142-50.
20. Taiwo AB. Exercise behaviour of female religious conservatives in Ojo Local Government, Lagos, Nigeria. Int J Christ Sports. 2022;1(1):126-30.