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An Echocardiogram Audit from a Tertiary Institution in South South Nigeria

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Abstract **Original Research Article**

Background: The Echocardiography Laboratory at the Rivers State University Teaching Hospital (RSUTH) serves a wide demographic from Port Harcourt and surrounding regions. As cardiovascular diseases rise in prevalence across Sub-Saharan Africa, periodic audits provide essential insight into evolving disease patterns and service demands. This study aimed to evaluate the clinical indications and echocardiographic diagnoses over a one-year period to inform practice improvement, strategic planning, and cardiovascular investment.

Methods: A retrospective, descriptive cross-sectional study was conducted using data from December 2022 to December 2023. Transthoracic echocardiographic reports were reviewed for demographic details, clinical indications, anthropometric data, and echocardiographic findings. Ethical clearance was obtained from the ethics committee of the Rivers State University Teaching Hospital. Data was collected on Excel spreadsheet and analysis was performed using SPSS version 25.

Results: A total of 830 echocardiograms were analyzed, comprising 471 females (56.75%) and 359 males (43.25%), with a mean age of 55.7 ± 15.6 years and mean BMI of 29.2 ± 6.8 kg/m². The most common indications for echocardiography were hypertension (36.7%), heart failure (14.7%), and chest pain syndromes (8.8%). Hypertensive heart disease was the most frequent echocardiographic diagnosis (43.6%), followed by valvular heart disease (11.1%), ischemic heart disease (10.0%), and cardiomyopathies (8.2%). Congenital heart diseases, mainly septal defects, accounted for 2.7% of cases. Isolated right heart strain was seen in 5.6%, and 18.7% had normal echocardiographic findings.

Conclusion: Hypertensive heart disease remains the dominant cardiac pathology in our setting. This audit highlights the diagnostic utility of echocardiography and the need for sustained investment in cardiovascular diagnostics and workforce training in Nigeria.

Keywords: Echocardiography, Cardiovascular Disease, Hypertension, Sub-Saharan Africa, Heart Failure, Ischemic Heart Disease, Valvular Heart Disease, Cardiomyopathy, Diagnostic Audit, Nigeria.

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INTRODUCTION

The use of Echocardiography in Nigeria started with the first M-mode scanners introduced to selected Nigerian teaching hospitals in the early 1980s, since then it's used has evolved.[1] The evolution of transthoracic echocardiography (TTE) has profoundly changed the diagnostic capability of cardiovascular care. Cardiovascular disease diagnosis was once limited to clinical suspicion and chest auscultation, the evaluation of cardiac function is now more precise, thanks to echocardiography's real-time imaging capabilities. This transformation has moved the diagnosis of congestive cardiac

failure from a vague, symptom-based framework with respect to the underlying pathology to informed paradigm, where valvular, myocardial, or congenital origins can be visualized directly. The widespread availability of echocardiography in tertiary and some secondary healthcare centers has also led to the increased recognition of congenital heart diseases conditions once thought rare or poorly understood in the adult populations. As a result, Nigerian clinicians are now equipped to make more informed decision and patient care plan. Published audits from Ibadan[2] and Lagos[3] confirm that modern echocardiography has shifted Nigerian cardiology practice from syndromic to etiology-driven management, with hypertensive heart disease, valvular lesions, and emerging congenital heart diseases (CHD) now clearly delineated at the bedside.

The expanding diagnostic power of transthoracic echocardiography (TTE) has symbiotically fueled the broader growth of cardiovascular services nationwide. Over the last decade Nigeria has seen the establishment of functional catheterization laboratories in Lagos, Abuja and Port-Harcourt, and a slow-but-steady resurgence of cardiothoracic surgery programs..[4-6] Echocardiography remains the power station to these advanced therapies: every coronary angiogram, valve replacement, or device closure begins with a sonographer's report Echocardiography is the power switch. Audit data from Lagos State University Teaching Hospital show that >90 % of cath-lab referrals undergo echo triage, underscoring its gate-keeping role in resource-limited environments.[4]

Echocardiography is not merely a diagnostic tool; it is the heartbeat of modern cardiology practice. In Nigeria's growing cardiac ecosystem, echocardiography is pivotal in the assessment of left and right ventricular function, chamber sizes, valve integrity, pericardial diseases, and intracardiac masses, as well as in estimating pulmonary pressures.[7] It's safe affordable and accessible when compared to cardiac MRI and CT, and this has made it indispensable. Echocardiography has accompanied and supported the expansion of cardiology practice from coronary angiography, percutaneous interventions, and the growth of cardiothoracic surgery in most Nigerian institutions.[8] From the outpatient clinic to the perioperative theatre and the emergency room, the versatility of echocardiography remains unmatched in guiding diagnostic and therapeutic decisions.[9-10]

Across Africa, where health systems face resource constraints and evolving disease burdens, echocardiography has emerged as a strategic diagnostic enabler in cardiovascular medicine.[1] Sub-Saharan Africa is witnessing a double burden of communicable and non-communicable diseases, with a rising prevalence of hypertension, rheumatic heart disease, ischemic heart disease, and cardiomyopathies.[11] In this setting, echocardiography plays a crucial role in early detection, guiding interventions before complications ensue.[12] As several African countries now implement national heart disease registries and cardiovascular initiatives, echocardiography forms the cornerstone of clinical staging, risk stratification, and surgical planning, thus offering both clinical and epidemiological insight.[13]

Despite its strengths, the **reproducibility and diagnostic reliability** of echocardiography depend significantly on the **skill and discipline of the sonographer or echocardiographer**.[1] The consistency of image acquisition, measurement technique, and anatomical recognition of measurement points, directly affect interpretive accuracy. Inadequately trained operators may overlook subtle pathologies, leading to underdiagnosis or misclassification.[14] Therefore, the sonographer is not merely a technician but an **active participant in cardiovascular diagnosis**, whose **proficiency and protocol adherence** ensure that the data obtained can be trusted for clinical decisions and serial comparison.[15] The clinical value of an echocardiogram is only as strong as its reproducibility. Nigerian studies have demonstrated low intra-observer variability for 2-D–guided M-mode measurements when scans are performed by trained sonographers following uniform protocols. [16]

In the light of this, the importance of a **comprehensive and standardized echocardiographic protocol** cannot be overstated. Protocols serve as the blueprint for cardiac imaging ensuring all relevant structures and functions are examined systematically.[17] While minor variations may exist between institutions, adherence to detailed protocols is essential to "leave no stone unturned." A complete echocardiographic study should include **chamber quantification, assessment of left ventricular geometry, systolic and diastolic function (for both ventricles), valvular structure and function, and targeted evaluation for ischemic heart disease.**[18] This standardization facilitates meaningful communication between clinicians, supports accurate trend analysis in follow-up, and underpins the strength of echocardiography as a reliable diagnostic instrument.[19] International societies (ASE/EACVI, BSE) emphasize systematic image acquisition: chamber dimensions, LV geometry, LV and right-ventricular systolic–diastolic function, valvular assessment, pulmonary pressures, regional wall-motion analysis, and aortic root sizing. Incomplete datasets risk missing concentric LV hypertrophy, early diastolic dysfunction or subtle ischaemia conditions that underlie the rising tide of hypertensive heart failure and IHD in West Africa.[20] Robust protocols therefore remain the linchpin for high-quality, actionable reports.

Improved paediatric care and earlier diagnosis have increased the survival of children with CHD into adulthood. Recent Nigerian series report a steady trickle of Eisenmenger complex, repaired tetralogy, and post-Fontan physiology presenting for adult follow-up.[21] Echo laboratories must therefore incorporate dedicated adult-CHD protocols—segmental analysis, shunt quantification, and postoperative surveillance—to meet this evolving demand. [22]

In the current decade, **speckle-tracking echocardiography (STE)** and **global longitudinal strain (GLS)** imaging have emerged as transformative tools in the echocardiographic arsenal. Unlike conventional parameters that detect dysfunction only after overt myocardial compromise, strain imaging allows for **early detection of subclinical left ventricular dysfunction**, even when ejection fraction appears preserved.[23]

This is especially invaluable in the surveillance of **cardiotoxicity from chemotherapy**,[24] **hypertensive heart disease**, and **diabetic cardiomyopathy**.[25] Furthermore, GLS has become an important marker in **risk stratification and prognostication**, particularly in patients with heart failure with preserved ejection fraction (HFpEF),[26] and in identifying **myocardial ischemia** when regional wall motion abnormalities are subtle or absent.[27] Its application is steadily growing in Nigeria's leading cardiovascular centers, yet wider dissemination, training, and integration into routine practice are necessary to harness its full clinical value.[28]

While transthoracic echocardiography remains the mainstay in most Nigerian facilities, the **underutilization of transesophageal echocardiography (TEE)** represents a critical gap. TEE offers superior imaging of posterior cardiac structures, prosthetic valves, atrial appendages, and septal integrity, and is the investigation of choice in **infective endocarditis, atrial fibrillation thrombus exclusion**, and **intraoperative cardiac monitoring**.[29] However, due to infrastructural limitations, cost barriers, and a shortage of trained personnel, its availability is **restricted to only a few centers** in Nigeria.[30] As **cardiac surgical services expand** and **perioperative monitoring becomes more complex**, the integration of TEE into more cardiology labs and intensive care units becomes not only desirable but imperative.[31]

The growing sub-discipline of **critical care cardiology** in Nigeria also demands a **parallel expansion in echocardiographic support**. Echocardiography in the intensive care unit (ICU) offers real-time evaluation of **hemodynamics, fluid status, cardiac output, tamponade physiology**, and shock states.[32] The advent of **point-of-care echocardiography (POCUS)** and focused cardiac ultrasound (FoCUS) is revolutionizing bedside care,[33] yet widespread implementation is hampered by inadequate access to portable machines and structured training programs.[34] As **more tertiary centers develop dedicated cardiac ICUs and high-dependency units**, the demand for skilled echocardiographers capable of performing rapid, targeted scans will rise sharply. Investment in **equipment, protocol training, and staffing** must anticipate this shift to avoid diagnostic delays in critically ill patients.[35]

Finally, the 21st century has ushered in the **digital revolution of artificial intelligence (AI)** a force now gaining ground in cardiovascular imaging. AI-driven echocardiography applications offer automated measurements, image optimization, and decision-support systems that can significantly **reduce interobserver variability, improve reproducibility**, and **accelerate workflow**.[36] Deep learning algorithms are being trained to detect patterns of disease—such as hypertrophic cardiomyopathy, amyloidosis, or ischemia—from echocardiographic datasets with increasing accuracy.[37] Though still in its early stages in Nigeria, AI has the potential to **bridge the diagnostic gap in under-resourced settings**, enabling less-experienced clinicians to perform high-quality echocardiography with real-time guidance.[38] Embracing AI-enhanced imaging should not be deterred as this will not replace human expertise but rather **amplify the reach and precision of cardiovascular diagnostics**, especially where well trained echocardiographers are few. [39-40]

Echocardiography remains a cornerstone in cardiovascular diagnostics, yet few contemporary, institution-specific audits from Nigeria provide detailed insights into its utilization, diagnostic yield, or alignment with international standards. There is a particular paucity of data from South-South Nigeria, a region with unique environmental exposures and evolving cardiovascular disease patterns. As the burden of non-communicable diseases rises, understanding local echocardiographic practices becomes critical to improving patient care and optimizing resource use.

This one-year retrospective audit was conducted at a tertiary teaching hospital in South-South Nigeria to address this knowledge gap. It will **delineate the range of clinical indications prompting transthoracic echocardiography (TTE) requests** and assess referral patterns within the institution. It will **characterize the spectrum of echocardiographic findings**, identifying the most prevalent cardiovascular pathologies and comparing them with regional and global disease patterns and **evaluate adherence to standard imaging protocols and minimum dataset requirements,** highlighting areas for improvement in documentation, image acquisition, and sonographer performance.

METHODS

Study Design and Setting

This study was a retrospective, hospital-based cross-sectional audit conducted at the Echocardiography Laboratory of the Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Rivers State, Nigeria. Port Harcourt is the capital of Rivers State and a major urban center in southern Nigeria. The audit covered echocardiographic studies conducted over a one-year period, aimed at evaluating the indications, clinical parameters, and echocardiographic findings of individuals referred for transthoracic echocardiography (TTE).

Study Population

The study included 830 individuals aged 18 years and above who were referred to RSUTH for echocardiographic evaluation during the audit period. Referrals originated from various units including internal medicine, surgery, nephrology, and preoperative clinics.

Inclusion Criteria

1. Adults aged ≥18 years
2. Referred for transthoracic echocardiography during the study period
3. Complete clinical and echocardiographic records

Exclusion Criteria

1. Patients who had poor imaging windows.

2. Patients aged less than 18 years.

Sample Size Justification: This study recruiting all consecutive patients referred to the echocardiography laboratory of the Rivers State University Teaching Hospital during the one-year study period, provided they met the inclusion criteria. This approach enhanced statistical power, improved the precision of subgroup and accounted for potential data attrition due to incomplete or inconclusive studies. Additionally, the larger sample size improved the external validity and generalizability of the study findings to the broader clinical population served by the hospital**.**

Data Collection

All patients underwent a structured clinical evaluation by trained echocardiogram lab assistants. Sociodemographic data (age, sex, height, weight) and clinical variables (systolic and diastolic blood pressure) were recorded using a standardized proforma. Height and weight were used to calculate body mass index (BMI), and body surface area (BSA) was computed using the Mosteller formula.

Blood pressure was measured twice using a calibrated mercury sphygmomanometer in a seated position, and the average of the two readings was used for analysis. Hypertension was defined in accordance with the 2013 European Society of Cardiology/European Society of Hypertension (ESC/ESH) guidelines: systolic blood pressure ≥140 mmHg, diastolic ≥90 mmHg, or current use of antihypertensive medication.[41]

Echocardiographic Protocol

All transthoracic echocardiograms were performed by certified cardiologists and experienced sonographers using either GE Logiq™ or GE Vivid IQ™ ultrasound machines. A standardized imaging protocol in line with the American Society of Echocardiography (ASE)[42] and British Society of Echocardiography (BSE)[43] recommendations was followed.

2D, M-mode, and Doppler imaging
Parasternal long- and short-axis views
Apical four-chamber, two-chamber, and three-chamber views
Subcostal and suprasternal views where indicated
Spectral Doppler (Pulsed and Continuous Wave) and color Doppler flow assessment
Left ventricular mass was indexed to body surface area (LVMI, g/m²)
Relative wall thickness (RWT) was calculated as 2 × posterior wall thickness / LV internal diameter at diastole[42/43]
Diastolic function was assessed using transmitral inflow patterns and tissue Doppler imaging of the mitral annulus
Valvular lesions were graded according to ASE guidelines[42]
Left atrial diameter (LAD)
Left ventricular dimensions (LVEDD, LVESD)
Interventricular septal thickness (IVSd), posterior wall thickness (PWTd)
Left ventricular mass index (LVMI)
Ejection fraction (EF, via Simpson's method)
Valvular abnormalities and regurgitation
Diastolic function grades
Presence of pulmonary hypertension or aortic sclerosis.

Definition of Abnormalities

1. Left atrial diameter (LAD) was considered abnormal when it measured greater than 4.0 cm, based on threshold values reported in a Nigerian study by Oyati et al.[44]
2. Left ventricular internal diameter in diastole (LVIDd) was regarded as dilated when it exceeded 5.6 cm, which may suggest ventricular enlargement or volume overload.
3. Relative wall thickness (RWT) was calculated using the formula: 2 multiplied by posterior wall thickness divided by left ventricular internal diameter in diastole. An RWT value greater than 0.43 was considered increased, indicating concentric remodeling or hypertrophy, in line with American Society of Echocardiography (ASE) guidelines.[42/43]
4. Left ventricular mass (LVM) was calculated using the formula:
   $LVM = 0.8 \times [1.05 \times (IVSd + LVIDd + PWTd)^3 - (LVIDd)^3] + 0.6$ grams.
   An elevated LVM indicated the presence of left ventricular hypertrophy.
5. Left ventricular ejection fraction (LVEF) was categorized as depressed when the value was less than 50%, signifying impaired systolic function.
6. Left ventricular diastolic function was evaluated using mitral inflow Doppler measurements, particularly the E/A ratio and deceleration time, to assess diastolic functions.E/A ratio: 1.0–1.5, DT: 160–240 ms.[42/43]

Ethical Considerations

Ethical approval was obtained from the RSUTH, Research Ethics Committee. Data confidentiality was maintained by anonymizing participant identifiers with unique study codes.

Statistical Analysis

Data were entered into Microsoft Excel, and analysis was performed using IBM SPSS Statistics version 25. Descriptive statistics were used to summarize demographic and clinical data. Continuous variables were presented as means and standard deviations, while categorical variables were presented

as frequencies and percentages. Independent sample t-tests were used to comparison of indications and diagnosis between groups males and females were expressed as graphs.

RESULTS

Demographic Characteristics

A total of eight hundred and thirty individuals (830) were included in the study, comprising 471 females (56.75%) and 359 males (43.25%). The mean age of participants was 55.71 ± 15.62 years, with a mean body mass index (BMI) of 29.24 ± 6.79 kg/m². The average systolic blood pressure (SBP) was 131.21 ± 23.85 mmHg, while the mean diastolic blood pressure (DBP) was 80.55 ± 13.67 mmHg

Clinical Indications for Echocardiography

The primary indications for transthoracic echocardiography during the study period were:

Hypertension: 304 patients (36.7%)
Congestive heart failure (CHF): 120 patients (14.7%)
Chest pain evaluation: 73 patients (8.8%)

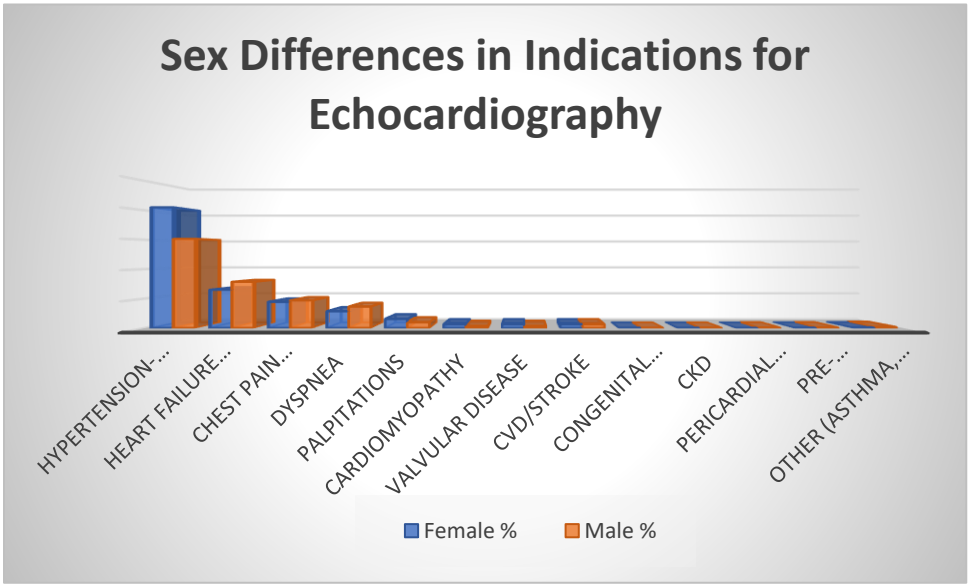
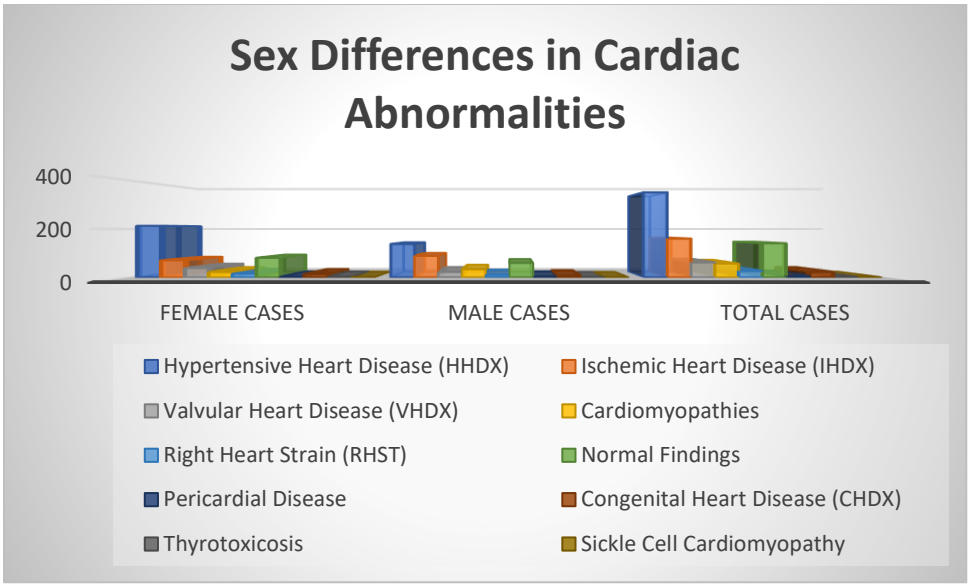


Table 1: Echocardiographic Findings.

Condition	Percentage (%)	Number of Individuals
Hypertension	43.6%	362
Valvular Heart Disease	11.1%	92
Ischaemic Heart Disease	10.0%	83
Cardiomyopathies	8.2%	68
Congenital Heart Disease	2.7%	23
Isolated Right Heart Strain	5.6%	55
Normal Findings	18.7%	147
	100%	830



DISCUSSION

A review of referral patterns to the Echocardiography Laboratory at the Rivers State University Teaching Hospital (RSUTH) highlights three dominant clinical indications: hypertension and its complications, congestive cardiac failure, and chest pain syndromes. These categories accounted for the majority of transthoracic echocardiographic studies during the audit period and mirror the most pressing cardiovascular challenges observed in the population. The high proportion of hypertension-related referrals underscores the pervasive burden of systemic hypertension in the region, often complicated by left ventricular hypertrophy or diastolic dysfunction. Heart failure referrals, both with preserved and reduced ejection fraction, reflect the downstream effects of chronic pressure overload and structural remodeling. Meanwhile, chest pain evaluations frequently to exclude ischemic heart disease demonstrate growing awareness and concern for atherosclerotic cardiovascular disease which was once thought and reported as rare in the Nigeria and African population. Together, these trends provide a lens into the evolving epidemiology of cardiac disease in South-South Nigeria and validate the central role of echocardiography in frontline cardiac diagnostics..

This audit of echocardiographic findings at the Rivers State University Teaching Hospital reveals important insights into the cardiovascular disease spectrum in Port Harcourt and its environs. Hypertensive heart disease was the predominant diagnosis, consistent with numerous reports across Nigeria and Sub-Saharan Africa,[45-47] where hypertension remains the leading modifiable risk factor for cardiac morbidity and mortality. The growing detection of ischemic heart disease and valvular disorders in our cohort reflects shifting patterns associated with urbanization, dietary transition, and increasing life expectancy.

Several hospital-based echocardiographic studies across Nigeria revealed similar findings as those in the index study, Umuerri's audit in Delta State analyzed 597 adult echocardiograms performed between August 2011 and April 2014.[48] in that cohort, **hypertensive heart disease was present in 274 individuals (45.9%)**, closely mirroring our finding of 43.6% . **Dilated cardiomyopathy** was diagnosed in **48 participants (8.0%),** and **rheumatic valvular heart disease** in **43 (7.2%).** Although ischemic heart disease was infrequently reported (2 cases, 0.3%) in this rural cohort likely reflecting limitations in diagnostic protocol nevertheless, our urban population demonstrated a higher prevalence (10%), emphasizing a rising trend in ischemic disease in urban centers.

The study by Aje et al.[2] at the University College Hospital, Ibadan, a high-volume tertiary center reported findings from 1,544 echocardiograms, nearly twice the sample size of the current audit. In that cohort, hypertensive heart disease was the most prevalent diagnosis, accounting for 44.6% of all cases, while valvular heart disease was observed in 3.5% of patients. These findings imply the dominating prevalence of hypertensive pathology in Nigerian echocardiographic practice and are in agrees with our current audit's observation of 43.6% prevalence for hypertensive heart disease. The relative consistency in these values across different regions of Nigeria strengthens the argument for prioritizing hypertension screening, control, and early echocardiographic evaluation as cornerstones of cardiovascular disease prevention.[49]

Across Sub-Saharan Africa, echocardiographic registries—such as VALVAFRIC and REMEDY—have highlighted a high burden of rheumatic valvular disease in younger populations. [50-51] In more urbanized and aging regions like Southern and Western Africa, degenerative valvular disease is increasingly prevalent. A tertiary center in South-West Cameroon reported that nearly half of left-sided valvular diseases were degenerative in origin.[52] Likewise, in Enugu, 18.7% of echocardiograms revealed degenerative mitral valve disease among older adults (mean age 68.3 ± 14.4 years) .[53-54] This trend aligns with previous findings in Port Harcourt: Agomuoh

et al.[55] reported that among 141 echocardiograms performed between 2000 and 2003 at the University of Port Harcourt Teaching Hospital, predominant diagnoses included hypertensive heart disease (34%), cardiomyopathies (19.9%), and rheumatic valvular hearts (9.2%); more recent stroke patient data from Port Harcourt noted valvular abnormalities in approximately 20% of cases .[56] Considering the mean age of 55.7 years in our cohort and the region's environmental challenges—such as pollution from oil flares—it is plausible that degenerative valvular heart disease contributes significantly as observed in 11.1% of our population. Increased longevity, urban lifestyle factors, and environmental stressors may explain this higher frequency compared to Ibadan, where Aje et al. reported a lower rate of valvular heart disease (3.5%) despite a similar age profile .[2]

Globally, the epidemiologic landscape of heart disease is markedly different. In high-income countries, **ischemic heart disease (IHD)** is the leading cause of heart failure and cardiovascular mortality. Large-scale echocardiographic audits from Europe and North America report high proportions of coronary artery disease, left ventricular systolic dysfunction (with ischemic aetiology), and degenerative valve disease—often exceeding 50% in older populations .[58] For instance, the MONICA[59] and ECHOES[60] studies has IHD as the aetiology more than half of all heart failure cases, while the EPICA[61] study in Portugal demonstrated age-specific LV systolic dysfunction prevalence of up to 16% in the elderly .

By contrast, ischemic heart disease accounted for just 10% of cases in our cohort markedly lower than the 50–60% typically reported in heart failure populations in high-income countries. This disparity likely reflects **under-diagnosis** in our setting, driven by limited access to coronary angiography and stress-testing infrastructure, as well as differences in population-level risk exposures and healthcare pathways.[62] In sub-Saharan Africa, the reported low rates of IHD are increasingly attributed to diagnostic inertia and gaps in acute care; many patients with STEMI are either unrecognized or do not reach catheterization-capable centers in time for definitive intervention.[63] However, additionally, lifestyle, genetic, and systemic health-system differences influence the epidemiology of ischemic disease, resulting in a distinct cardiovascular disease amongst the African populace in sharp contrast when compared with Western populations.[64]

The predominance of hypertensive heart disease in Nigeria and the broader Sub-Saharan region is largely driven by high rates of uncontrolled hypertension—characterized by low awareness, limited access to preventive care, and poor treatment adherence.[65-66] The shift in valvular disease patterns from rheumatic to degenerative forms mirrors the region's epidemiologic transition: rheumatic pathology predominates in younger populations, while age-related calcific valve disease is increasingly detected in older adults.[67-68] In contrast, the lower identified rates of ischemic heart disease likely reflect diagnostic constraints; advanced diagnostic modalities such as stress echocardiography and coronary CT angiography are not routinely available in our setting.[70-71] Lifestyle factors (diet, physical inactivity), genetic predispositions, and systemic healthcare disparities further shape the regional atherosclerotic burden and disease presentation.[72]
This audit has successfully characterized the distribution of echocardiographic diagnoses in a major tertiary hospital, fulfilling its aim of providing clarity on prevalent cardiovascular conditions in the region. The findings underscore the need for investment in hypertension screening and management, expansion of valvular heart disease diagnostics, and capacity building in ischemic heart disease evaluation. Moreover, the high diagnostic yield of echocardiography in this study supports its role as a cost-effective frontline tool in cardiovascular disease assessment and planning.

From the figure depicting the gender- based differences it's clear that there are notable differences in the spectrum of echocardiographic abnormalities between males and females. Hypertensive heart disease was the most common diagnosis in both sexes but occurred more frequently among females, possibly reflecting higher healthcare utilization or earlier screening. Males showed a higher prevalence of ischemic heart disease and cardiomyopathies, aligning with established global trends of male predisposition to coronary artery disease and structural myocardial disorders. Valvular heart disease was more frequently observed in females, suggesting a higher burden of degenerative or rheumatic valve pathology. Normal echocardiographic findings were also more common in females, which may indicate earlier-stage disease detection or non-cardiac indications for referral. These differences highlight the importance of sex-specific considerations in cardiovascular risk profiling, diagnostic evaluation, and clinical management.

CONCLUSION

This one-year audit of transthoracic echocardiographic services at the Rivers State University Teaching Hospital offers a robust and insightful profile of cardiovascular disease patterns in South-South Nigeria. The findings reaffirm that hypertensive heart disease remains the most frequently encountered cardiac abnormality, underscoring the persistent and pervasive impact of poorly controlled systemic hypertension in the region. Notably, echocardiography proved to be a highly diagnostic modality, with over 90% of scans revealing structural or functional abnormalities—highlighting the high pre-test probability and the clinical appropriateness of most referrals.

The detection of ischemic heart disease and degenerative valvular pathology—particularly in middle-aged and elderly patients—signals an ongoing epidemiological transition. This shift reflects broader urbanization trends, dietary and lifestyle changes, increased life expectancy, and the growing prevalence of non-communicable diseases in Nigeria. While congenital heart disease and right heart strain were less frequently observed, their presence—especially among adult referrals—demonstrates the importance of early diagnosis and lifelong surveillance.

Sex-based differences in referral patterns and disease burden also emerged, with women more frequently presenting with hypertensive and valvular heart disease, while men showed higher prevalence of ischemic disease and cardiomyopathies. These differences may reflect both biological variation and disparities in healthcare-seeking behavior.

Importantly, this audit underscores the centrality of echocardiography in cardiovascular diagnostics and clinical decision-making. It not only facilitates accurate etiologic classification of heart disease but also serves as a gatekeeper to advanced therapies including coronary interventions, cardiac surgery, and device therapy.

RECOMMENDATIONS

- Strengthen hypertension detection, treatment, and follow-up systems as a public health priority.
- Expand access to stress echocardiography, transesophageal echocardiography, and coronary imaging to improve ischemic heart disease detection.
- Promote sex-sensitive cardiac screening and targeted education to bridge diagnostic gaps.
- Institutionalize periodic echocardiographic audits to monitor trends, evaluate quality, and inform policy.

In conclusion, the RSUTH echocardiography audit not only maps out the contemporary cardiovascular landscape in a major tertiary center but also provides actionable insights for improving diagnostic accuracy, service delivery, and long-term patient outcomes in resource-limited settings.

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