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Relative Frequency and Proportional Distribution of Rehabilitation-Related Conditions in Rural Primary Healthcare: A Retrospective Multi-Center Audit in North-Eastern Nigeria

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Abstract

Background

Global health guidelines state that comprehensive primary care must incorporate promotive, preventive, curative, and rehabilitative services. In sub-Saharan Africa, physical rehabilitation infrastructure remains concentrated within urban tertiary centers, creating geographic barriers for rural communities. As a result, frontline rural Primary Health Care (PHC) facilities manage a substantial volume of musculoskeletal and neurological cases, though this clinical burden remains undocumented due to manual record vulnerabilities and diagnostic tracking gaps. This study evaluated the relative frequency, socio-demographic distribution, and referral patterns of rehabilitation-related conditions presenting to rural primary clinics in North-Eastern Nigeria.

Methods

A multi-center, retrospective audit of institutional health charts was conducted across three rural PHC centers (Garko, Barambu, and Pandaya) in the Akko Local Government Area of Gombe State, North-Eastern Nigeria. Charts covering a five-year timeline (January 2021 to December 2025) were analyzed. To address data missingness and reconstruct a 2022 calendar year archive gap caused by document degradation, a parallel recovery pipeline cross-referencing pharmacy logs and nursing sub-registries was executed. An *a priori* sample size estimation established an initial target pool of 410 records, which yielded a final, fully cleaned analytic cohort of N = 384 patients following the exclusion of 26 compromised files. Raw clinical logs were extracted using a uniform digital proforma and mapped into standardized pathological classifications via an explicit diagnostic translation matrix. Quantitative analysis was performed using non-parametric and descriptive statistics in SPSS Version 26.0.

Results

A total of 384 unique medical records matching the case definition were validated, fulfilling the statistical sample target. Normality testing using the Shapiro-Wilk test confirmed that the age distribution was highly right-skewed ($W = 0.842$, $p < 0.001$). The cohort presented a median age of 22.0 years (Interquartile Range [IQR]: 18.0–34.5 years) and showed a minor female predominance (52.6%, n = 202). Physical rehabilitation demand was heavily concentrated within the young, economically active workforce aged 16–25 years (43.8%, n = 168). Primary Musculoskeletal and Orthopedic Disorders comprised the largest share of the clinical workload (49.2%, n = 189), led by mechanical Low Back Pain (28.1%, n = 108), Generalized Body Pain (11.5%, n = 44), and acute soft-tissue trauma (9.6%, n = 37). Regional Degenerative and Soft-Tissue Patterns represented the second largest overall grouping (24.2%, n = 93), led by suspected Knee Osteoarthritis (9.6%,n = 37). Peripheral Nerve and Neuromuscular Presentations accounted for 12.3% (n = 47), featuring Post-Injection Sciatic Nerve Palsy (6.8%, $n = 26$), while Primary Neurological Conditions comprised 8.6% (n = 33), dominated by post-stroke hemiplegia

(7.8%, n = 30). Operational tracking revealed an extensive care containment barrier: 85.9% (n = 330) of all cases were managed locally through palliative pharmacotherapy, whereas only 14.1% (n = 54) received a formal outward referral to specialized tertiary rehabilitation institutions.

Conclusion

Rural primary healthcare centers in North-Eastern Nigeria manage a substantial, unrecorded burden of physical disability that selectively affects young adult workers. The high level of local containment and low referral rates highlight an operational bottleneck linked to spatial and economic access barriers. Health administrators should upgrade primary data collection tools, provide basic screening and triage training for frontline health workers, and decentralize physical rehabilitation services through community-based frameworks to support rural populations.

Introduction

Primary Health Care (PHC) serves as the core foundational nucleus of any resilient health system, functioning as the primary entry point for individuals within the formal continuum of care [1]. As emphasized by the Declaration of Astana and modern global health frameworks, achieving Universal Health Coverage (UHC) requires a primary care model that systematically integrates promotive, preventive, curative, and rehabilitative services [1, 2].

In sub-Saharan Africa, including the Federal Republic of Nigeria, national health strategic directives have explicitly incorporated these key pillars into their structural guidelines, mandating that restorative and rehabilitative options be made universally accessible within community environments [3]. Within this primary tier, physical rehabilitation services play an essential dual role in clinical examination and triage. By screening, evaluating, and establishing early care plans for acute and chronic conditions, early primary-tier rehabilitation mitigates long-term functional loss, prevents secondary structural complications, and lowers downstream tertiary healthcare expenditures [4, 5].

Despite these clear policy objectives and clinical benefits, a significant implementation gap persists within the Nigerian health system. The primary care tier currently operates at less than 20% of its potential patient volume, and formal referral networks remain largely non-functional [6]. This systemic deficit is particularly acute in rural environments, where approximately half of the national population resides [7]. In many developing nations, physiotherapy remains structurally undervalued at the primary level, frequently mischaracterized as a high-cost, secondary- or tertiary-contact service that must be reserved exclusively for urban teaching hospitals [5, 8]. Consequently, rural populations face severe health inequities, forced to navigate geographic and financial barriers—including high transport costs, poor road infrastructure, and long travel distances—to access urban facilities [8, 9].

Furthermore, the World Health Organization's (WHO) Rehabilitation 2030 initiative emphasizes the urgent need to transition from centralized models to community-integrated care to address the rising global

burden of non-communicable diseases and musculoskeletal disorders [10]. However, health authorities cannot deploy physical therapy personnel, implement community-based rehabilitation (CBR) programs, or allocate clinical resources effectively without objective data regarding the existing burden at the front lines.

In North-Eastern Nigeria, a region shaped by socio-ecological vulnerabilities and historical conflict, the exact scale and pattern of rehabilitation-related conditions at the primary care level remain unquantified. While frontline clinicians regularly evaluate individuals presenting with functional limitations, degenerative bone and joint pathologies, and neurological deficits, these cases are rarely tracked or coded as rehabilitative conditions. Instead, they are captured using broad, non-specific symptomatic labels in manual outpatient logbooks.

This tracking gap creates an administrative blind spot, leaving health planners with little documentation to justify integrating physical therapy into the primary healthcare framework. Additionally, manual paper registries in these rural areas are highly vulnerable to physical document degradation and archival loss during staff turnover.

To date, few multi-center audits have investigated the distribution of rehabilitative conditions presenting to frontline clinics in rural sub-Saharan Africa. Systematic, retrospective health records audits offer an evidence-based method to map diagnostic realities, reveal demographic distributions, and uncover patterns of healthcare utilization [11, 12].

Therefore, this multi-center retrospective audit was designed to determine the relative frequency and proportional distribution of rehabilitation-related conditions presenting at rural Primary Health Care centers in Akko Local Government Area, Gombe State, North-Eastern Nigeria, over a 5-year window. By documenting these clinical patterns, demographic characteristics, and operational pathways, this study aims to provide the empirical evidence necessary to guide resource allocation, improve epidemiological documentation, and advocate for the integration of physiotherapy into rural primary healthcare systems.

Methods

Study Design

This investigation utilized a multi-center, retrospective audit of institutional clinical records to analyze the healthcare burden, relative frequency, and distribution of presentations requiring physical rehabilitation at primary care entry points. A retrospective approach was selected to capture historical clinical trends, assess real-world facility utilization patterns, and evaluate systemic referral pipelines without altering standard clinical workflows or introducing observational bias [1]. The data collection involved a rigorous review of manual outpatient logs, daily pharmacy dispensing registries, and archived patient charts spanning a continuous five-year period from January 2021 through December 2025.

Study Settings

The audit was carried out across three primary healthcare (PHC) centers within the Akko Local Government Area (L.G.A.) of Gombe State, North-Eastern Nigeria: Garko PHC, Barambu PHC, and Pandaya PHC. These facilities function as the primary formal care gateways for a predominantly rural, agrarian population. The local workforce engages heavily in labor-intensive occupations without mechanical assistance, and the community experiences significant geographic isolation from urban tertiary centers located in the provincial capital.

Sampling, Case Definition, and Inclusion Criteria

To minimize selection bias, a comprehensive census sampling strategy was implemented, evaluating all eligible patient entries within the specified five-year timeframe across the three study locations.

- **Case Definition**: A "rehabilitation-related condition" was defined as any neuro-musculoskeletal, orthopedic, pediatric developmental, or cardiopulmonary condition presenting with functional limitations, pain, or movement disabilities that would typically benefit from physical therapy or restorative interventions [2].
- **Inclusion Criteria**: All legible medical files recording a primary diagnosis or primary symptom profile fitting the operational case definition within the designated multi-year window were included, without exclusions based on age or gender.
- **Exclusion Criteria**: Patient charts with entirely missing clinical notes, highly fragmented records preventing clinical classification, or completely illegible text were excluded from the final analysis.

Sample Size and Statistical Power Justification

An *a priori* sample size estimation was conducted using the Cochran formula for single proportions to verify that the final cohort provided sufficient statistical power to reflect the distribution of rehabilitative conditions accurately:

$n = Z\ p\ (1 - p)/d$

$n = Z^2 \cdot p \cdot (1 - p)/d^2$

Where Z is the standard normal distribution value corresponding to a 95% confidence level (Z = 1.96), d is the absolute margin of error established at the standard 5% boundary (d = 0.05), and p represents the anticipated relative frequency of the most prevalent clinical condition. To ensure a highly conservative and mathematically rigorous sample threshold, maximum variance was assumed (p = 0.50), yielding the following calculation:

$n = (1.96)^2 \cdot 0.50 \cdot (1–0.50)\}/(0.05)^2 = \{3.8416 \cdot 0.25\}\{0.0025\} = 384.16$

Thus, a baseline statistical requirement of approximately **384 patients** was identified. To build an operational safety buffer against unavoidable chart attrition, missing data fields, and structural archival damage common in manual paper registries, the research team targeted an expanded extraction pool of **410 clinical entries** across the five-year auditing window.

A systematic, consecutive sampling framework was implemented across the records departments of the three participating facilities (Garko PHC, Barambu PHC, and Pandaya PHC). Data extraction teams chronologically screened and captured 410 consecutive outpatient log entries matching the operational case definition.

However, during the subsequent rigorous data cleaning and verification phase, 26 records were permanently excluded due to critical administrative and clinical deficits. Specifically, 12 files presented with completely missing demographic variables, 9 contained unclassifiable colloquial or traditional diagnoses that lacked any secondary clinical notes, and 5 suffered from severe physical ink degradation that rendered the text entirely illegible. The exclusion of these 26 compromised entries resulted in a final, fully cleaned and evaluable analytic cohort of **N = 384** unique patients. This final sample size satisfies the *a priori* statistical calculation required to guarantee a 95% confidence level and an absolute precision margin of 5%.

Archive Continuity, Data Recovery Protocol, and Sensitivity Analysis

Archive Continuity, Data Recovery Protocol, and Sensitivity Analysis
Initial administrative assessments revealed significant record vulnerabilities, including an absolute data gap for the 2022 calendar year resulting from physical folder degradation, storage constraints, and rapid administrative staff turnover. To resolve this chronological gap and achieve the required statistical power, a secondary data-recovery pipeline was executed. The research team manually cross-referenced alternative institutional logbooks, specifically daily pharmacy registers (screening for long-term or high-dose prescriptions of non-steroidal anti-inflammatory drugs [NSAIDs] and skeletal muscle relaxants) and maternal health logbooks. The institutional identification numbers retrieved from these secondary registries were used to track and locate missing individual case cards within the secondary folder files.

Utilizing pharmacy daily dispensing logs filtered specifically for NSAIDs and skeletal muscle relaxants as an entry point introduced a distinct selection bias. This targeted screening mechanism mathematically guaranteed that any patient recovered from the 2022 gap would present with pain or neuromuscular symptoms, thereby artificially biasing the 2022 sub-cohort (n = 72) toward musculoskeletal and orthopedic clinical presentations.

To evaluate the statistical distortion introduced by this recovery pipeline on our overall epidemiological metrics, a post-hoc statistical sensitivity analysis was conducted by recalculating our clinical distribution metrics *without* the 72 cases recovered from the 2022 calendar year (n = 312). The comparative analysis revealed that the relative frequency of Musculoskeletal and Orthopedic Disorders shifted only marginally (dropping from 49.2% [n = 189/384] in the combined dataset to 48.7% [n = 152/312] in the restricted 4-year baseline cohort). Similarly, mechanical Low Back Pain (LBP) varied marginally, moving from 28.1% to 27.6%. This minor statistical variation demonstrates that while the data-recovery pipeline was methodologically skewed toward pain presentations, it did not significantly alter the primary public health conclusions of this study.

Data Harmonization and Diagnostic Standardization Protocol

Given the operational reliance on paper-based registries and the heterogeneous clinical nomenclature utilized by frontline Community Health Extension Workers (CHEWs), a rigorous, *a priori* diagnostic mapping framework was deployed. Raw clinical records frequently contained vernacular symptom descriptions, non-standard shorthand, or localized anatomical descriptors (e.g., *"cin kugu"* or *"waist pain"*).

To eliminate misclassification bias and standardize the diagnostic categories, two independent physical therapists systematically cross-referenced these raw entries against a structured clinical translation matrix (**Supplementary Table 1**). A raw entry was mapped onto a standardized rehabilitative classification only when its primary qualitative descriptor aligned with established anatomical boundaries, and was corroborated by secondary clinical markers such as documented physical trauma mechanisms, asymmetrical motor impairments, or specific pharmacotherapeutic indicators. Inter-rater discrepancies regarding the mapping of ambiguous records were resolved via blind adjudication by a third, senior specialist in community-based rehabilitation informatics.

Results

Socio-Demographic Profiling of the Audited Cohort

A formal normality assessment using the Shapiro-Wilk test demonstrated that the age distribution of the audited population deviated significantly from normality ($W = 0.842$, $p < 0.001$). The cohort age curve is strongly skewed to the right, showing a heavy concentration of cases in the younger demographics. Consequently, non-parametric descriptive statistics were applied to characterize the group.

The **median age of the overall cohort was 22.0 years (Interquartile Range [IQR]: 18.0 to 34.5 years)**, with an absolute age range stretching from 1.5 months to 84.0 years. Analysis of gender showed a minor female predominance, with females comprising 52.6% (n = 202) of the audited population and males comprising 47.4% (n = 182).

The physical rehabilitation burden was heavily concentrated within the young adult demographic, with 43.8% (n = 168) of all patients falling into a narrow window between 16 and 25 years of age. The older adult cohort aged > 25 years comprised 45.8% (n = 176), within which older adults and geriatric patients aged 60 years and above represented a minor sub-group of only 7.3% (n = 28) of the audited charts. Adolescents aged 6–15 years accounted for 6.2% (n = 24), while early pediatric cases aged 0–5 years represented 4.2% (n = 16).

Table 1
Socio-Demographic Profile of the Audited Population (N = 384)

Demographic Variable	Frequency (n)	Relative Frequency (%)
Gender		
Female	202	52.6%
Male	182	47.4%
Age Category (Years)		
0–5 (Early Pediatric)	16	4.2%
6–15 (Adolescent)	24	6.2%
16–25 (Young Adult Workforce)	168	43.8%
>25 (Older Adult Cohort)	176	45.8%
Total Cohort Size	**384**	**100.0%**
Cohort Age Summary (Non-Parametric)	**Value**	**Statistical Metric**
Median Age (IQR)	22.0 (18.0–34.5)	Years
Absolute Range	0.12–84.0	Years

Relative Frequency and Pathological Distribution of Conditions

The 32 individual physical presentations extracted during the audit were grouped into six core physical rehabilitation classifications to evaluate the diagnostic workload at the primary care tier (Table 2).

Primary Musculoskeletal and Orthopedic Disorders represented the clear majority of the clinical volume, accounting for 49.2% (n = 189) of all verified entries. Within this primary category, mechanical Low Back Pain (LBP) was the single most common presentation across the entire study, comprising 28.1% (n = 108) of the total cohort burden. This was followed by Generalized Body Pain (GBP) at 11.5% (n = 44) and acute soft-tissue or mechanical Trauma at 9.6% (n = 37).

The remaining clinical volume was distributed among specialized neurological, peripheral nerve, pediatric, and regional degenerative conditions. **Primary Neurological Conditions** accounted for 8.6% (n = 33) of the total sample, driven almost entirely by cerebrovascular accidents presenting as Stroke with associated hemiplegia or hemiparesis (7.8%, n = 30) peripheral nerve and neuromuscular disorders were fully itemized, showing a notable relative frequency of Post-Injection Sciatic Nerve Palsy (6.8%, n = 26) and Bell's Palsy (5.5%, n = 21).

Specialized **Pediatric Rehabilitative Conditions** made up 5.0% (n = 19) of the cohort, consisting of Obstetric Brachial Plexus Palsy (Erb's Palsy, 2.9%, n = 11) and developmental delays or suspected

Cerebral Palsy (2.1%, n = 8). **Regional Degenerative and Soft-Tissue Patterns** represented the second largest overall grouping at 24.2% (n = 93), led by clinically suspected Knee Osteoarthritis (9.6%, n = 37), Cervical Spondylosis (7.6%, n = 29), and upper-extremity soft-tissue disorders including Shoulder Conditions/Adhesive Capsulitis (7.0%, n = 27). **Specialized Urogenital Rehabilitation** comprised the remaining 0.8% (n = 3) of the audited caseload, restricted entirely to physical complications stemming from obstetric or post-traumatic Vesico-Vaginal Fistula (VVF).

Table 2
Proportional Clinical Distribution and Pathological Categorization (N = 384)

Pathological Category and Presenting Diagnosis	Frequency (n)	Relative Frequency (%)
PRIMARY MUSCULOSKELETAL & ORTHOPEDIC DISORDERS	**189**	**49.2%**
Low Back Pain (LBP)	108	28.1%
Generalized Body Pain (GBP)	44	11.5%
Acute Physical Trauma (Soft-tissue/Fractures)	37	9.6%
PRIMARY NEUROLOGICAL CONDITIONS	**33**	**8.6%**
Stroke (Hemiplegia/Paresis)	30	7.8%
Advanced Spinal Cord Injury (Quadriplegia/Paraplegia)	3	0.8%
PERIPHERAL NERVE & NEUROMUSCULAR PRESENTATIONS	**47**	**12.3%**
Post-Injection Sciatic Nerve Palsy*	26	6.8%
Bell's Palsy (Facial nerve paralysis)	21	5.5%
PEDIATRIC REHABILITATIVE CONDITIONS	**19**	**5.0%**
Obstetric Brachial Plexus Palsy (Erb's Palsy)	11	2.9%
Pediatric Developmental Delay / suspected Cerebral Palsy	8	2.1%
REGIONAL DEGENERATIVE & SOFT-TISSUE PATTERNS	**93**	**24.2%**
Knee Osteoarthritis (suspected/degenerative)	37	9.6%
Cervical Spondylosis (Neck pain/stiffness)	29	7.6%
Shoulder Conditions (Adhesive Capsulitis/Tendinopathy)*	27	7.0%
SPECIALIZED UROGENITAL REHABILITATION	**3**	**0.8%**
Vesico-Vaginal Fistula (VVF) physical complications	3	0.8%
Total Validated Core Physiotherapy Functional Burden	**384**	**100.0%**

Operational Referral Pipelines and Outcomes

Analysis of clinical management pathways revealed an imbalance between local maintenance and outward referral tracking (Table 3). Of the 384 patients presenting with physical impairments within the scope of rehabilitative care, an overwhelming majority of 85.9% (n = 330) were managed locally at the primary care level without formal outward referral triage.

In contrast, only 14.1% (n = 54) of the cohort received a formal referral to secondary or tertiary rehabilitation institutions. Facility-specific evaluations showed consistent management patterns across all three locations, indicating a shared operational bottleneck within the primary care framework.

Table 3
Operational Referral Pipelines (N = 384)

Operational Status	Frequency (n)	Relative Frequency (%)
Managed Locally / Non-Referral Pipeline	**330**	**85.9%**
Retained at primary care tier without exit triage	330	85.9%
Formally Referred to Higher Tiers	**54**	**14.1%**
Triaged to Secondary/Tertiary Physiotherapy Centers	54	14.1%
Total Monitored Pathways	**384**	**100.0%**

Discussion

The institutional data gathered from this multi-center retrospective clinical audit establish an empirical baseline regarding the relative frequency, socio-demographic distribution, and categorization of rehabilitation-related conditions within the primary healthcare framework of North-Eastern Nigeria. By resolving historical database gaps through secondary archive recovery and expanding the analysis to a statistically powered cohort of N = 384 unique cases, this investigation highlights a clear, unrecorded burden of neuro-musculoskeletal disorders and physical impairments routinely presenting to rural primary facilities. These individuals seek treatment within a tier of healthcare delivery that is not structurally or operationally equipped to provide specialized physical rehabilitation.

The distinctly right-skewed demographic profile identified in this audit marked by a youthful **median age of 22.0 years (IQR: 18.0–34.5)** diverges sharply from western epidemiological models, where physical rehabilitation utilization is conventionally dominated by geriatric populations experiencing age-related degenerative disorders [6]. In the rural ecosystem of the Akko Local Government Area, this clinical concentration within a young cohort highlights a profound structural relationship between economic geography and musculoskeletal vulnerability.

The regional economy relies heavily on labor-intensive subsistence agriculture and informal transit sectors, such as commercial motorcycle transport. These occupational roles demand prolonged

structural overloading, repetitive manual lifting, and unmitigated physical strain, which are performed without ergonomic infrastructure or mechanical protection.

Crucially, economic necessities in this agrarian setting demand that individuals enter the manual workforce during late adolescence. This early exposure to cumulative micro-trauma, coupled with high exposure to acute soft-tissue injuries (9.6%, n = 37) from traffic accidents on poorly maintained rural road networks, shifts the peak burden of physical impairment into the most productive years of life.

When debilitating functional conditions like mechanical low back pain (28.1%) selectively compromise the young adult workforce aged 16–25 years (43.8%, n = 168), the public health consequences transform into broader economic challenges. By impairing the physical capacity of primary agricultural producers, these untreated musculoskeletal conditions directly undermine domestic food security, reduce household income, and reinforce a structural cycle of rural poverty. This underscores the critical need for early, accessible primary rehabilitation interventions.

Methodological Implications of the Data-Recovery Execution

A notable methodological contribution of this research is the deployment and validation of the secondary data-recovery pipeline used to resolve the 2022 archival gap. In rural primary care facilities across sub-Saharan Africa, documentation gaps driven by physical record damage, inadequate filing architectures, and frequent staff turnover regularly lead to missing data timelines [4]. These gaps often force researchers to exclude complete calendar blocks, which can weaken the statistical validity of long-term epidemiological trends.

By systematically auditing secondary facility logs specifically pharmacy dispensing books (filtering for long-term prescriptions of NSAIDs and muscle relaxants) and nursing vital signs registries the research team extracted patient identification numbers that allowed individual files to be recovered within the secondary folder archives.

This recovery framework reclaimed 72 complete files for the 2022 calendar year, comprising 18.8% of the final dataset. This execution demonstrates a practical strategy for global health researchers working in resource-constrained environments: missing primary diagnostic logbooks can often be reconstructed by validating parallel operational datasets.

For health informatics planners, this finding highlights the importance of moving away from vulnerable paper registries and integrating simplified digital health platforms within the national health information architecture, ensuring non-communicable chronic conditions are monitored as reliably as acute infectious diseases [5].

Epidemiological Characterization of Musculoskeletal and Neurological Workloads

The high prevalence of **Primary Musculoskeletal and Orthopedic Disorders** (49.2%, n = 189) within the audited cohort aligns with global epidemiological data positioning mechanical and structural impairments as primary drivers of years lived with disability (YLDs) [2]. Within this domain, mechanical **Low Back Pain (LBP)** was the single largest diagnostic entity, constituting 28.1% (n = 108) of the total clinical workload.

This high relative frequency is tied to the socio-demographic and economic structure of the Akko Local Government Area. As a primarily rural district in Gombe State, the local economy relies on subsistence agriculture and manual trades. These occupations require prolonged periods of heavy lifting, repetitive bending, and strenuous manual labor, typically performed without mechanical assistance or ergonomic adjustments.

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Excluding non-rehabilitative cardiopulmonary records clarifies the volume of specific peripheral nerve pathologies and localized degenerative conditions. **Regional Degenerative and Soft-Tissue Patterns** made up nearly a quarter of the audited sample (24.2%, n = 93), led by clinically suspected Knee Osteoarthritis (9.6%, n = 37) and Cervical Spondylosis (7.6%, n = 29). These presentations represent a major source of unmanaged functional limitation among older adults who lack local access to manual therapy, joint mobilization, or targeted exercise regimens.

Concurrently, the volume of **Peripheral Nerve and Neuromuscular Presentations** (12.3%, n = 47) specifically Post-Injection Sciatic Nerve Palsy (6.8%, n = 26) exposes a critical structural risk factor in local healthcare delivery. In rural settings, improper intramuscular injection techniques administered by untrained personnel for acute febrile illnesses frequently cause direct sciatic nerve trauma [7]. Without early access to physical therapy, this often leads to permanent foot drop and long-term motor deficits in pediatric and young adult populations.

Chronic neurological conditions, led by cerebrovascular accidents presenting as **Stroke** (7.8%, n = 30), also formed a key clinical subgroup. The steady presentation of hemiplegia and hemiparesis at rural primary health clinics reflects the broader epidemiological transition occurring across sub-Saharan Africa, where non-communicable cardiovascular risk factors are rising alongside traditional infectious diseases [7].

When stroke survivors are discharged from urban tertiary centers after acute medical stabilization, they return to rural communities where they rely on primary health care (PHC) centers for long-term care. The presence of these patients in rural clinics highlights a major gap in post-acute care, emphasizing the need for structured neuro-rehabilitative services outside major urban centers.

Analyzing the Systemic Referral Bottleneck

The highly disproportionate institutional distribution between local symptomatic containment and outward tertiary referral clinical tracking (85.9% versus 14.1%) exposes a major structural failure in the primary-to-tertiary health continuum. Ideally, primary health facilities function as screening gates that triage patients with specialized physical impairments upward to secondary or tertiary physiotherapy units [8]. However, our data indicates that the vast majority of patients with functional impairments remain trapped within the primary care tier.

This containment points to two institutional limitations. First, because primary health centers lack resident physical therapy staff and physical modalities, local management is almost exclusively limited to palliative pharmacotherapy. Frontline health workers frequently prescribe repeated cycles of analgesics and oral NSAIDs. While this temporarily addresses pain symptoms, it does not treat the underlying physical impairment, putting patients at risk for secondary clinical complications like gastrointestinal bleeding, analgesic nephropathy, and permanent structural disability [9].

Second, the remarkably low referral rate reflects real-world socioeconomic and spatial barriers. Clinicians working in Akko L.G.A. are aware that referring a rural resident to a specialized facility in the capital introduces immediate economic challenges. Long travel distances, poor road networks, high out-of-pocket transportation costs, and hospital fees often lead to complete patient default [7]. Primary care staff therefore resort to prolonged local pharmacological management because a formal referral is often economically unfeasible for the patient's family.

Strategic Policy Recommendations

To address the structural gaps identified in this audit, three clear policy interventions are recommended:

1. **Task-Shifting and Targeted Training**: The Gombe State Ministry of Health should integrate basic musculoskeletal and functional disability screening protocols into the continuous education frameworks of CHEWs and primary care nurses. Training frontline workers to recognize and safely manage mechanical conditions can reduce systemic dependency on NSAIDs.
2. **Decentralization via Community-Based Rehabilitation (CBR)**: Rather than keeping rehabilitation services centralized in urban tertiary environments, health planners should deploy mobile physical therapy units and implement CBR programs. Establishing periodic rehabilitation outreach clinics at primary health points can deliver low-cost, effective care directly to rural populations.
3. **Digital Standardization of Registries**: The National Health Management Information System (NHMIS) registers utilized at the PHC level should be updated to include clear, dedicated columns for tracking physical and functional disabilities using standard ICF nomenclature. This will eliminate the reliance on vague symptomatic labels and provide health planners with more accurate epidemiological data.

Limitations of the Study

Several limitations should be noted when interpreting these findings. First, due to the retrospective nature of the study, data quality was bounded by the completeness of the physical facility registers; missing clinical notes prevented a deeper evaluation of specific disease sub-types. Second, because clinical documentation at this tier is typically performed by non-specialist community health staff, the diagnoses reflect clinical mapping approximations based on symptoms rather than advanced diagnostic confirmation. Finally, the lack of accurate total outpatient population denominators across the historical timeline prevented the calculation of true population prevalence rates, limiting our analysis to relative frequencies and proportional distributions within the audited cohort.

Methodological Limitations and Sensitivity Analysis

A primary institutional limitation of this clinical audit stems from the targeted secondary data-recovery protocol deployed to bridge the 2022 archival data gap. By using pharmacy dispensing logs (specifically filtering for prolonged or high-dose NSAID and muscle relaxant prescriptions) to extract hospital identification numbers and reconstruct lost clinical files, a systematic selection bias was introduced. This entry point inherently selected for patients presenting with acute or chronic pain profiles, artificially biasing the 2022 sub-cohort ($n = 72$) toward musculoskeletal and orthopedic clinical presentations.

To evaluate the statistical distortion introduced by this recovery pipeline on our overall epidemiological metrics, a sensitivity analysis was performed by removing the 2022 sub-cohort and recalculating the pathological distribution for the remaining four structurally sound calendar years (n = 312).

The comparative analysis revealed that the relative frequency of Musculoskeletal and Orthopedic Disorders dropped by only 0.5% (shifting from 49.2% [n = 189/384] in the combined dataset to 48.7% [n =

152/312] in the restricted timeline). Similarly, mechanical Low Back Pain (LBP) varied marginally, moving from 28.1% to 27.6%.

This minor statistical variation demonstrates that while the data-recovery pipeline was methodologically skewed toward pain presentations, it did not significantly alter the primary public health conclusions of this study. The high volume of musculoskeletal complaints reflects a genuine, cross-sectional regional burden driven by the labor-intensive agrarian economy of the Akko Local Government Area rather than an artifact of administrative data recovery. Nevertheless, this documentation vulnerability highlights the urgent need to transition from manual registries to unified digital databases at the primary care tier to eliminate retrospective sampling bias.

A primary institutional limitation of this clinical audit stems from the secondary data-recovery protocol deployed to bridge the 2022 archival data gap. As noted in the methodology, using pharmacy dispensing logs (specifically filtering for prolonged or high-dose NSAID and muscle relaxant prescriptions) to extract patient identification numbers and reconstruct lost clinical files introduced a systematic selection bias. This entry point inherently selected for patients presenting with pain profiles, biasing the 2022 sub-cohort (n = 72) toward musculoskeletal and orthopedic clinical presentations.

Although our statistical sensitivity analysis confirmed that removing the 2022 data caused only a negligible baseline shift of 0.5% in our primary pathological categories (confirming the macroscopic robustness of the regional public health trends), the presence of this selection bias must be factored into any cross-regional comparisons.

Furthermore, because the chart review relied entirely on retrospective registries, the clinical designations for specialized profiles like Knee Osteoarthritis (9.6%) and Cervical Spondylosis (7.6%) represent provisional, clinically suspected presentations rather than radiographically confirmed diagnoses, given the lack of primary-tier imaging infrastructure.

Ultimately, these document vulnerabilities and data missingness windows highlight the urgent administrative need to transition from manual, vulnerable paper registries to unified electronic health records (EHR) at the primary care tier. Implementing simplified electronic tracking would entirely eliminate retrospective sampling bias, safeguard archive continuity, and ensure that non-communicable functional physical disabilities are monitored as reliably as acute infectious diseases.

Declarations

Declarations

Ethics Approval and Consent to Participate:

Approved by the Health Research Ethics Committee of the Gombe State Ministry of Health (Approval Number: GMS/MOH/REC/26/04). The requirement for individual patient informed consent was formally

waived by the ethics committee due to the strictly retrospective, non-interventional nature of the audit and the exclusive use of fully anonymized secondary institutional datasets. Patient institutional data access waivers were granted due to the retrospective nature of the de-identified chart audit.

Consent for Publication:

• Not applicable.

Competing Interests:

• The authors declare that they have no competing interests.

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Author Contribution

Suleiman Mohammed was responsible for the study conception and design. Habib Saad, Bashir Kaka, Farida G. Sumaila, led the data acquisition and performed the statistical analysis. Abubakar Babayo Babangida Shehu Bappah, Buhari Hassan, Aliyu Musa drafted the initial manuscript. Auwal Bello Hassan, Buhari Tafida, Zainab Umar Dahiru, provided critical intellectual revisions. All authors have reviewed and approved the final version of the manuscript for submission.

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Data Availability

"The datasets generated and/or analyzed during the current study are not publicly available due to participant privacy and institutional ethical restrictions governing secondary primary health center audit records in the Akko Local Government Area. However, anonymized datasets are available from the corresponding author (Suleiman Mohammed: Suleiman.mohammed@fuhsa.edu.ng) upon reasonable

academic request and upon approval by the Health Research Ethics Committee of Gombe State Ministry of Health."

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13. Supplementary Table 1. Diagnostic Translation Matrix and Clinical Harmonization Framework.

Supplementary Files

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- SupplementaryTable1.docx