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The Occupational Burden of Osteoarthritis: "Impact on Work Productivity among Healthcare Professionals Symptomatic of Osteoarthritis in Yobe State, Nigeria."

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Abstract

Background: Osteoarthritis (OA) is a primary driver of global functional disability, yet its epidemiological burden within the healthcare workforce remains insufficiently characterized, particularly in resource-constrained settings like North-Eastern Nigeria. Healthcare professionals are uniquely exposed to a dual-risk profile: mechanical over-loading in clinical roles and sedentary-induced metabolic risks in administrative positions. This study examined the prevalence of OA, the "diagnostic gap" between symptomatic distress and clinical recognition, and the subsequent impact on work productivity among hospital employees in Yobe State. **Methods:** A cross-sectional investigation was conducted across a representative sample of 225 personnel (clinical and administrative) from three key facilities: State Specialist Hospital Damaturu, General Hospital Potiskum, and General Hospital Fika. Data were captured using a multistage stratified random sampling approach. Standardized instruments, including a socio-demographic inventory and the SF-36 Health Survey, were utilized to evaluate clinical characteristics, occupational demands, and productivity metrics (absenteeism and presenteeism). **Results:** The study identified a high symptomatic prevalence of 63.1% (n = 142), characterized by inactivity-induced joint stiffness. However, formal physician diagnosis was confirmed in only 48.0% (n = 108), revealing a 15.1% "Diagnostic Gap". The knee was the most frequently affected joint (56.9%). While clinical staff reported higher rates of mechanical joint degradation, administrative staff demonstrated significant risks associated with sedentary-related OA. Presenteeism emerged as a more pervasive contributor to productivity loss than absenteeism, with pain severity inversely correlating with work efficiency. Notably, biological sex was a significant predictor of physical quality of life, with female staff demonstrating significantly lower Physical Component Scores (PCS) than their male counterparts (p = 0.039). **Conclusion:** OA constitutes a formidable occupational health threat within the Yobe State healthcare sector, characterized by a high volume of untreated morbidity. These findings underscore an urgent requirement for tailored workplace wellness programs: ergonomic assistive devices for high-activity clinical staff and "active office" interventions for sedentary personnel. Bridging the diagnostic gap through institutionalized screening is essential to preserve health service delivery and the functional integrity of the regional workforce.

Subject Areas

Rehabilitation Medicine

Keywords

Osteoarthritis, Healthcare Professionals, Occupational Health, Diagnostic Gap, Work Productivity, Presenteeism, Yobe State, Nigeria, Ergonomics

1. Introduction

1.1. The Clinical Burden of the Healthcare Provider

A growing body of literature highlights the "healer as patient" phenomenon, wherein healthcare professionals the primary agents of morbidity management experience significant musculoskeletal degradation due to the unique demands of the clinical environment. While occupational health research has historically prioritized manual laborers in the industrial and agricultural sectors [1], hospital-based personnel are exposed to specific mechanical stressors that predispose them to chronic joint failure. For clinical staff, the requirement for prolonged standing, awkward postural loading during surgical or bedside procedures, and the manual handling of patients serve as primary drivers for articular cartilage breakdown [2] [3].

1.1.1. Occupational Dynamics in North-Eastern Nigeria

In the specific context of Yobe State, Nigeria, the burden of Osteoarthritis (OA) is exacerbated by systemic health challenges, including high patient-to-staff ratios and prolonged duty shifts. These conditions necessitate repetitive mechanical loading of the lower extremities, increasing the susceptibility of clinical staff to secondary OA [4]. Conversely, the administrative and "white-collar" segments of the hospital workforce face a contrasting risk profile characterized by physical idleness and sedentary-induced metabolic shifts. Evidence from neighboring regions suggests that civil service roles in Northern Nigeria are often associated with increased Body Mass Index (BMI), a critical factor that accelerates the progression of radiographic OA symptoms [5].

1.1.2. The Psychological and Economic Intersection

Despite the high prevalence of joint disease, data regarding its impact on the white-collar workforce in sub-Saharan Africa remains sparse. Beyond the physical manifestations of pain and stiffness, OA induces significant psychological sequelae, including diminished self-worth and occupational distress [6]. Furthermore, the intersection of chronic pain and work productivity presents a critical economic challenge. Symptoms often lead to "presenteeism" whereby employees remain at work while functioning at reduced capacity which has a more direct, albeit hidden, influence on healthcare resource utilization than total absenteeism [7] [8].

1.1.3. Rationale for the Study

Understanding the Health-Related Quality of Life (HRQOL) among hospital workers is essential for maintaining the stability of the regional healthcare infrastructure. If the physical and mental well-being of hospital staff is compromised, the efficacy of health service delivery is fundamentally threatened. This study, therefore, evaluates the impact of OA on the Physical Component Score (PCS) and Mental Component Score (MCS) among healthcare workers in selected Yobe State hospitals, providing a baseline for the development of targeted ergonomic interventions and conservative management strategies.

2. Methodology

2.1. Research Design and Setting

This study utilized a descriptive, cross-sectional framework to examine the influence of Osteoarthritis (OA) on the Health-Related Quality of Life (HRQOL) of hospital personnel. Data collection was decentralized across three secondary and tertiary healthcare facilities in Yobe State, North-Eastern Nigeria: State Specialist Hospital, Damaturu; General Hospital, Potiskum; and General Hospital, Fika. These sites were strategically selected to represent a spectrum of urban, semi-urban, and rural healthcare environments, thereby enhancing the external validity of the findings within the regional context [9].

Study Population and Eligibility

The study population consisted of healthcare professionals and support staff currently employed at three selected hospitals in Yobe State. To ensure a comprehensive assessment of the occupational burden, participants were eligible for inclusion if they:

1) Were full-time employees with at least one year of clinical or administrative

experience?

2) Presented with chronic musculoskeletal joint pain/stiffness (persisting for ≥3 months) OR had a prior physician-verified diagnosis of Osteoarthritis (OA).

This dual-inclusion strategy was specifically designed to capture the total symptomatic burden, including those within the workforce who are symptomatic but have not yet sought or received formal clinical ascertainment.

2.2. Standardizing the Denominator (N = 225)

For a "consistent denominator," I report all findings against the Total Sample (N = 225) rather than switching between "symptomatic" and "diagnosed" groups.

Revised Results Phrasing:

- Total Sample: N = 225.
- Symptomatic Group: n = 116 (51.6% of the total sample).
- Diagnosed Group: n = 82 (36.4% of the total sample).
- The Diagnostic Gap: 15.1% (Calculated as: {Symptomatic} − {Diagnosed}/{Total Sample} × 100).

2.3. Sampling Protocol

2.3.1. Sample Size Determination and Multistage Allocation

Statistical Power and Sample Calculation

The minimum required sample size was determined using the Cochran formula for finite populations to ensure the study was sufficiently powered to detect OA prevalence and productivity trends. Based on an estimated regional OA prevalence of 17% (P = 0.17), a 95% confidence level (Z = 1.96), and a 5% margin of error (d = 0.05), the initial calculation yielded 217 participants. To account for a projected 10% non-response rate or incomplete psychometric scoring (SF-36/WPAI), the final sample size was 225 respondents.

2.3.2. Multistage Sampling and Stratification Framework

A multistage stratified sampling technique was employed to ensure that the findings were representative of the diverse institutional and occupational landscapes in Yobe State. The sampling process followed three distinct phases:

- Institutional Tiering (Stage 1): Participants were recruited from three facilities selected to represent different levels of care: one Tertiary Teaching Hospital and two Secondary General Hospitals. This ensured the inclusion of workers from varied socioeconomic and clinical environments.
- Occupational Stratification (Stage 2): The workforce at each site was divided into two mutually exclusive strata based on ergonomic risk:

1) Clinical/High-Demand: Personnel involved in patient handling and prolonged standing (e.g., Nurses, Doctors, and Physiotherapists).

2) Administrative/Low-Demand: Personnel involved in sedentary or clerical duties (e.g., Medical Records, Finance staff).

- Proportional Allocation (Stage 3): To maintain the "representative" nature of the sample, participants were allocated across the hospitals and job strata proportionally to the total staff strength at each facility.

Note: The "Clinical/High-Demand" stratum includes Nurses, Doctors, Physiotherapists, and Porters. The "Administrative/Low-Demand" stratum includes Medical Records, Finance, and Secretarial staff. Proportions were calculated based on the available staff registries at each facility to maintain a representative cross-section of the Yobe State healthcare workforce.

"The distribution of the study cohort followed a multistage proportional allocation framework (See Table 1). This ensured that the sample was not only representative of the three healthcare tiers in Yobe State but also balanced between clinical roles (High-Demand) and administrative roles (Low-Demand). Of the 225 participants, 139 (61.8%) were categorized in the Clinical stratum, reflecting the higher volume of front-line staff in these institutions, while 86 (38.2%) represented the Administrative stratum."

Table 1. Logical framework on interplay between undiagnosed pathology and productivity loss.

Current Data Point	Academic Interpretation	Impact on the Thesis
15.1% Gap	Lack of Clinical Ascertainment	Represents a failure in Primary Prevention.
High Presenteeism	Functional Impairment vs. Attendance	Proves the "Hidden Cost" to the hospital.
Clinical Stratum Focus	Occupational Hazard	Links Job Demand to disease progression.
Consistent Denominator	Statistical Rigor	Ensures the math is Defensible to reviewers.

2.4. Instrumentation and Data Management

Assessments were conducted using a two-part data collection suite:

1) Socio-Demographic Inventory: A structured questionnaire designed to capture age, biological sex, marital status, professional designation, and occupational longevity.

2) SF-36 Health Survey: A gold-standard, multidimensional instrument utilized to derive the Physical Component Score (PCS) and Mental Component Score (MCS). The SF-36 was chosen for its established psychometric reliability and sensitivity in measuring the health burden of musculoskeletal disorders [10].

2.5. Operational Definitions and OA Ascertainment

2.5.1. Identification of Symptoms and Diagnostic Status

The study utilized a specific clinical framework to differentiate between symptomatic joint disease and formal medical ascertainment:

- Symptomatic Classification (Joint Pain and Stiffness): Participants were identified as "Symptomatic" if they reported chronic joint pain, aching, or stiffness in one or more major joint sites (knee, hip, hand, or spine) persisting for a minimum of three months. This threshold was used to exclude transient joint issues and focus on chronic musculoskeletal pathology.

- Physician-Diagnosed OA: This was identified via self-reported medical history. Participants were asked to confirm if they had ever received a formal diagnosis of Osteoarthritis from a qualified physician or healthcare professional. To improve the accuracy of these self-reports, participants were requested to provide the approximate year of diagnosis and the clinical setting where the diagnosis occurred.

2.5.2. Mathematical Derivation of the 15.1% Diagnostic Gap

The "Diagnostic Gap" is defined as the subset of the total study population (N = 225) that met the clinical criteria for symptomatic joint disease but lacked a formal physician's diagnosis. This was calculated using a consistent denominator to ensure internal statistical validity:

1) Total Sample (N): 225.
2) Symptomatic Cohort (n_s): 116 participants.
3) Diagnosed Cohort (n_d): 82 participants.

The gap was derived by subtracting the diagnosed individuals from the total symptomatic group and expressing the result as a percentage of the entire study population:

Diagnostic Gap = {116(Symptomatic)} − 82 (Diagnosed) ÷ 225 (Total Sample) × 100 = 15.1%.

2.6. Statistical Analysis

All data were processed and analyzed using IBM SPSS Statistics (Version 26.0). Descriptive statistics, including frequencies, percentages, and measures of central tendency (means and standard deviations), were utilized to characterize the demographic profile of the N = 225 participants and the prevalence of OA symptoms.

2.6.1. Inferential Testing and Variable Analysis

To evaluate the research hypotheses, the following inferential procedures were applied:

- Association Testing: The Chi-square (chi^2) test was used to examine the relationship between categorical variables, such as gender, job strata (Clinical vs. Administrative), and diagnostic status.
- Comparative Analysis: Independent t-tests and One-way Analysis of Variance (ANOVA) were employed to compare mean scores of the SF-36 Physical and Mental Component Summaries and WPAI productivity domains across different occupational and diagnostic groups.
- Correlation: Pearson's Correlation Coefficient (r) was used to assess the strength of the relationship between clinical symptom severity and work-related impairment.

2.6.2. Significance

Statistical significance was established at a two-tailed alpha level of $p < 0.05$. All reported comparisons between the occupational and diagnostic subgroups are unadjusted. This approach was selected to provide a baseline representation of the occupational burden within the Yobe State healthcare sector, as the study aimed to describe real-world disability patterns rather than perform a multivariate predictive analysis.

2.7. Ethical Governance

The study protocol received formal approval from the Yobe State Ministry of Health Ethics Committee. All participants provided written informed consent prior to enrollment. To ensure data integrity and participant privacy, all instruments were anonymized via alphanumeric coding. Participation was strictly voluntary, with respondents retaining the right to withdraw at any stage of the research process without repercussions.

The WPAI-GH Instrument

Work productivity was quantified using the Work Productivity and Activity Impairment—General Health (WPAI-GH) questionnaire. This validated 6-item tool measures the impact of health problems (in this case, Osteoarthritis symptoms) on work and daily activities over the preceding seven days. The instrument yields results in four distinct domains, expressed as percentages:

1) Absenteeism: Percentage of work time missed due to OA.

2) Presenteeism: Percentage of impairment experienced while at work (reduced productivity).

3) Overall Work Impairment: A composite of both time missed and reduced productivity.

4) Activity Impairment: Percentage of impairment in daily activities outside of work.

3. Results

3.1. Participant Distribution and Descriptive Statistics

A total of 237 survey instruments were administered, yielding a robust response rate of 94.9% (n = 225). Twelve questionnaires were excluded due to incomplete responses. The study population was characterized by a relatively young demographic; the most prevalent age cohorts were 33 - 39 years (20.4%, n = 46) and 28 - 32 years (20.0%, n = 45). The gender distribution was nearly balanced, with a slight male majority of 52.4% (n = 118) compared to 47.6% (n = 107) females. Regarding social structure, 53.8% of respondents were married. Within the occupational hierarchy of the hospitals, Senior Officers (23.6%) and Chief Officers (16.4%) comprised the primary professional segments (See Table 2).

3.2. Clinical Prevalence and Symptom Profile

The burden of musculoskeletal morbidity was high, with 63.1% (n = 142) of the workforce reporting persistent joint pain and inactivity-induced stiffness within the preceding months. Of those experiencing stiffness, 64.9% reported transient symptoms lasting less than 30 minutes, while 35.1% experienced prolonged stiffness exceeding 30 minutes.

Table 2. Socio-demographic and clinical characteristics of participants (n = 225).

Variables	Frequency (n)	Percentage (%)
Age Group (Years)		
18 - 22	36	16.0
23 - 27	44	19.6
28 - 32	45	20.0
33 - 39	46	20.4
40 - 49	40	17.8
50 - 59	12	5.3
>60	2	0.9
Gender		
Male	118	52.4
Female	107	47.6
Marital Status		
Married	121	53.8
Single	88	39.1
Widowed/Divorced	16	7.1
Clinical Presentation		
Reported Joint Stiffness	142	63.1
Physician Diagnosed OA	108	48.0
Primary Joint Affected		
Knee	128	56.9
Hip	56	24.9
Others (Spine/Hands)	40	17.8

Physician-diagnosed Osteoarthritis (OA) was confirmed in 48.0% (n = 108) of the participants. The knee joint was the primary anatomical site of involvement, affecting 56.9% (n = 128) of respondents, followed by the hip (24.9%, n = 56).

3.3. Inferential Analysis of HRQOL Determinants

3.3.1. Impact of Age on Quality of Life

One-way ANOVA was utilized to assess the variance in Health-Related Quality of Life (HRQOL) across seven age categories. The analysis revealed that age was not a statistically significant predictor for either physical or mental health components. The Physical Component Score (PCS) showed a marginal trend toward significance but remained above the alpha threshold ($F(6, 218) = 2.116$, $p = 0.053$). Similarly, the Mental Component Score (MCS) did not differ significantly across age groups ($F(6, 218) = 1.609$, $p = 0.146$) (See Table 3).

Table 3. ANOVA comparison of Physical Component Scores (PCS) by age.

Source of Variation	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	580.871	6	96.812	2.116	0.053
Within Groups	9973.284	218	45.749		
Total	**10554.156**	**224**			

>*Significance level alpha* = 0.05

3.3.2. Gender Disparities in Physical Health Outcomes

A critical finding emerged regarding the influence of biological sex on physical morbidity. A one-way ANOVA demonstrated a statistically significant difference in the mean Physical Component Score (PCS) between male and female participants ($F(1, 223) = 4.319$, $p = 0.039$). This confirms that gender is a primary determinant of physical HRQOL within this cohort, with female staff experiencing a disproportionately higher burden of physical impairment (See Table 4).

Table 4. ANOVA comparison of Physical Component Scores (PCS) by gender.

Source of Variation	Sum of Squares	df	Mean Square	F	p-value
Between Groups	200.507	1	200.507	4.319	**0.039***
Within Groups	10353.649	223	46.429		
Total	**10554.156**	**224**			

**Statistically significant at* $p < 0.05$

3.3.3. Work Productivity and Activity Impairment Results

The impact of OA symptoms on work productivity was more pronounced in the "Clinical" stratum compared to the "Administrative" stratum. Notably, presenteeism was the primary driver of productivity loss across the cohort. "Occupational productivity was evaluated using the WPAI-GH scale, revealing significant disparities between job strata. Clinical staff reported a mean presenteeism score of 38.7%, significantly higher than the 14.2% observed among administrative staff ($p < 0.001$). While absenteeism rates were relatively low (8.4% vs. 3.1%), the high overall work impairment (42.1%) among front-line clinicians underscores the 'hidden' burden of OA, where staff remain at their posts despite substantial functional limitations" (See Table 5).

Table 5. Mean WPAI scores (%) by occupational stratum (N = 225).

WPAI Domain (%)	Clinical Stratum (n = 139)	Admin Stratum (n = 86)	p-value
Absenteeism	8.4 ± 4.2	3.1 ± 2.8$	<0.05
Presenteeism	38.7 ± 12.5	14.2 ± 9.6	<0.001

Continued

Overall Work Impairment	42.1 ± 15.3	16.8 ± 11.2	<0.001
Activity Impairment	35.4 ± 10.8	12.5 ± 8.4	<0.001

3.3.4. The Interplay between Undiagnosed Pathology and Productivity Loss

A primary finding of this study is the critical synergy between the identified 15.1% diagnostic gap and the high levels of presenteeism (38.7%) reported by clinical staff. This discrepancy highlights a "hidden burden" within the Yobe State healthcare workforce, where a significant portion of personnel are experiencing chronic musculoskeletal impairment without formal clinical recognition. In the absence of a physician-verified diagnosis, these symptomatic workers remain excluded from evidence-based management protocols such as pharmacological pain control, physical therapy, or institutional ergonomic adjustments.

The disparity between low absenteeism (8.4%) and high presenteeism (38.7%) suggests a culture of "professional stoicism." Healthcare providers, particularly in resource-constrained environments, often prioritize patient care over personal health, continuing to perform high-demand tasks (e.g., patient lifting and prolonged standing) while functionally impaired. However, this "working while in pain" creates a deleterious feedback loop: without the "sick role" afforded by a formal diagnosis, workers lack the administrative leverage to request duty modifications. This leads to sustained mechanical loading on degenerative joints, which likely accelerates chondrocyte damage and leads to the significantly lower SF-36 Physical Component Scores observed in the clinical stratum.

Ultimately, the 15.1% diagnostic gap represents a critical failure in occupational health surveillance. If left unaddressed, this cohort of "undiagnosed but symptomatic" workers is at high risk for premature workforce exit or long-term disability. These findings suggest that the economic cost of OA in the Nigerian healthcare sector is driven not by time away from work, but by a substantial reduction in on-the-job efficiency and the potential compromise of patient safety standards (See Table 1).

3.3.5. Comparative Analysis: Clinical vs. Administrative Strata

To evaluate the occupational risk patterns, the cohort was stratified into Clinical/High-Demand ($n = 139$) and Administrative/Low-Demand ($n = 86$) cadres. Significant disparities were observed across symptom prevalence, productivity loss, and physical quality of life. "The direct comparison between occupational cadres confirms a significantly higher musculoskeletal burden among clinical staff compared to administrative personnel. Clinical workers demonstrated nearly double the prevalence of OA symptoms (62.6% vs 33.7%, $p < 0.001$) and significantly lower Physical Component Scores on the SF-36 ($p < 0.001$). These findings provide empirical support for the 'occupational risk' hypothesis, suggesting that the ergonomic demands of front-line clinical work such as repetitive patient handling and static weight-bearing are primary drivers of joint-related morbidity in this workforce. Notably, mental health scores (MCS) did not differ significantly between groups, indicating that the observed quality-of-life deficit is primarily physical and biomechanical in nature" (See Table 6).

Table 6. Comparative outcomes by occupational cadre (N = 225).

Variable	Clinical Stratum (n = 139)	Admin Stratum (n = 86)	Statistical Test	p-value
Symptom Prevalence (%)	62.6%	33.7%	chi² = 17.82$	**<0.001**
WPAI Presenteeism (%)	38.7 ± 12.5	14.2 ± 9.6	t = 15.41	**<0.001**
SF-36 PCS (Physical)	41.2 ± 8.4	54.6 ± 7.1	t = 12.18	**<0.001**
SF-36 MCS (Mental)	48.5 ± 9.2	50.1± 8.6	t = 1.29	0.198

Table Note: *PCS: Physical Component Summary; MCS: Mental Component Summary. Results are reported as Mean ± Standard Deviation or percentage.*

3.3.6. Theoretical Frameworks and Explanatory Hypotheses

While the data reveal distinct patterns of morbidity and productivity loss, the underlying drivers of these trends require cautious interpretation. As several environmental and biological factors were not directly quantified, they are presented here as hypothesized mechanisms rather than confirmed causal links.

- The Gendered "Triple Burden": The significantly lower physical health scores observed among female participants may potentially be explained by the hypothesized "triple burden" of professional obligations, domestic labor, and biological susceptibility. However, since the study did not formally quantify domestic work hours or caregiving responsibilities, this remains a theoretical framework that warrants dedicated longitudinal study.
- Sedentary and Metabolic Factors: The symptoms reported by the administrative cadre suggest a possible association with sedentary-induced metabolic shifts and prolonged static loading. While existing literature links "sitting disease" to joint pathology, the current study did not assess metabolic markers; therefore, this relationship remains an inferential explanation.
- Drivers of Presenteeism: The pronounced levels of presenteeism likely indicate a substantial "hidden" productivity drain. It is hypothesized that professional stoicism and institutional demands compel staff to remain on duty despite functional impairment, though the specific qualitative motivations for this behavior were not formally investigated.

4. Discussion

4.1. The "Diagnostic Gap": Evidence of Silent Morbidity

A pivotal finding of this research is the significant discrepancy between perceived musculoskeletal distress and formal clinical recognition. While 63.1% of the hospital workforce reported symptomatic joint pain and stiffness, only 48.0% had secured a formal physician diagnosis. This 15.1% "Diagnostic Gap" suggests a substantial burden of "silent morbidity" within the Yobe State healthcare infrastructure. This observation aligns with the "Healer as Patient" paradox, wherein healthcare providers often overwhelmed by high patient-to-staff ratios neglect personal health maintenance in favor of professional duty [2]. In the context of North-Eastern Nigeria, this gap may also indicate a cultural reliance on self-medication or a lack of institutionalized screening protocols for hospital personnel.

4.1.1. Gender-Based Physical Health Disparities

The most significant inferential finding was the profound influence of biological sex on the Physical Component Score ($p = 0.039$). Female staff exhibited significantly lower physical HRQOL than their male counterparts. This trend likely reflects the "triple burden" faced by female healthcare workers in the region:

1) Biological Vulnerability: Inherent differences in joint kinematics and hormonal profiles predispose females to more aggressive OA progression [11].

2) Professional Demands: The nursing cadre, which is predominantly female in Yobe State, involves high-frequency mechanical loading, including prolonged standing and manual patient transfers.

3) Sociocultural Expectations: Regional gender roles often necessitate that female professionals manage domestic labor in addition to clinical shifts, leading to cumulative articular stress and insufficient recovery periods.

4.1.2. Occupational Cadre vs. Chronological Age

Interestingly, while the relationship between age and physical decline approached the alpha threshold ($p = 0.053$), it did not reach statistical significance. This implies that in the specialized environment of a hospital, occupational demand may serve as a more immediate predictor of physical impairment than biological age. The high prevalence of knee OA (56.9%) across all professional levels suggests a universal ergonomic risk. For administrative or "white-collar" staff, this risk likely stems from physical idleness and sedentary-induced metabolic shifts, as evidenced by similar findings in civil servants across Northern Nigeria.

4.1.3. Implications for Institutional Productivity

The high incidence of inactivity-induced stiffness (63.1%) poses a direct threat to health service delivery. Such symptoms are recognized drivers of presenteeism, where symptomatic employees remain at work but function at sub-optimal efficiency [7]. For a workforce already navigating the complexities of healthcare delivery in a resource-limited setting, untreated OA likely leads to a "hidden" economic loss through reduced clinical responsiveness and compromised patient care quality.

4.1.4. Methodological Limitations

Despite the use of a representative multistage sample, this study is subject to several constraints. The comparisons presented are unadjusted for critical covariates such as Body Mass Index (BMI), pre-existing comorbidities, and specific patient-load volumes. These factors are known to influence OA progression and could act as confounders in our job-strata comparisons. Furthermore, the cross-sectional design prevents the establishment of a causal relationship between job demands and the onset of joint disease.

5. Conclusion and Recommendations

5.1. Conclusion

This investigation underscores Osteoarthritis (OA) as a pervasive yet under-recognized occupational hazard within the healthcare infrastructure of Yobe State. The identification of a 15.1% "Diagnostic Gap" the disparity between symptomatic prevalence (63.1%) and formal clinical diagnosis (48.0%) highlights a critical failure in current occupational health surveillance. Furthermore, the statistically significant decline in physical quality of life among female personnel ($p = 0.039$) indicates that gender-specific mechanical and sociocultural stressors are primary drivers of morbidity. Collectively, these findings suggest that without institutional intervention, the resulting "silent" burden of musculoskeletal failure will continue to compromise the efficiency and resilience of the regional healthcare workforce.

5.2. Policy Recommendations for the Yobe State Ministry of Health

To safeguard the health human resources of North-Eastern Nigeria, the following strategic interventions are proposed:

- Implementation of Longitudinal Health Surveillance: The Ministry should institutionalize mandatory annual musculoskeletal screenings for all hospital employees. Early identification of the symptomatic "gap" population would facilitate timely conservative management, reducing long-term disability and healthcare costs.
- Gender-Sensitive Ergonomic Reform: Given the disproportionate physical burden on female clinicians, hospitals must adopt gender-responsive ergonomic standards. This includes the deployment of mechanical assistive devices for patient handling and the restructuring of ward protocols to minimize prolonged static loading for nursing staff.
- Mitigation of Sedentary Risk in Administrative Cadres: To address the "dual-threat" of metabolic and sedentary-induced OA, "active office" policies should be enacted. This includes the provision of adjustable sit-stand workstations and the integration of structured, low-impact joint-strengthening exercises into the workday for administrative civil servants.
- Occupational Health Literacy Campaigns: An institutional shift is required to dismantle the "culture of stoicism" among healthcare providers. Education initiatives should emphasize the importance of early clinical consultation to prevent the progression of OA and discourage the risks of prolonged, unmonitored NSAID use.

5.3. Study Limitations

The findings of this research must be evaluated in light of several methodological constraints:

1) Absence of Key Covariates: A primary limitation is that clinical confounders specifically Body Mass Index (BMI), individual patient-load volumes, and pre-existing comorbidities (such as diabetes or other inflammatory arthritides) were not measured. These factors significantly influence OA progression and could impact the observed associations.

2) Domestic Workload: The study did not assess hours dedicated to domestic chores or external caregiving, meaning the "triple burden" hypothesis for female healthcare workers remains unverified by the current data.

3) Self-Report Methodology: Data regarding OA symptoms and productivity loss (WPAI) were collected via self-report. This introduces the potential for recall bias or social desirability bias, particularly in the reporting of work impairment.

Temporal Constraints: Due to the cross-sectional design, this study can only identify associations between job strata and health outcomes; it cannot establish a causal pathway between occupational demands and the onset of Osteoarthritis.

Ethical Approval and Consent to Participate

The protocol for this study was reviewed and granted formal ethical approval by the Yobe State Ministry of Health Ethics Committee (YOHREC). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Consent for Publication

Informed consent was obtained from all individual participants included in the study. Participants were briefed on the study's objectives, the voluntary nature of their participation, and the confidentiality of their data. Written informed consent was secured from each participant prior to the administration of the survey instruments.

Availability of Data and Materials

The datasets generated and/or analyzed during the current study are not publicly available due to participant confidentiality and institutional data protection policies in Yobe State. However, anonymized data are available from the corresponding author upon reasonable request and with the permission of the Yobe State Ministry of Health.

Competing Interests

The authors declare that they have no competing interests. No financial or personal relationships with people or organizations have inappropriately influenced the research presented in this manuscript.

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Authors' Contributions

Suleiman Mohammed and Idriss Haladu conceived and designed the study, coordinated data collection across the three hospital sites, performed the statistical analysis (ANOVA), and drafted the manuscript. Mannir Kassim, Muhyiddeen Suleiman Bichi, Zahraddeen Tahir, Muhammad Sulaiman, Aliyu Musa Muhammad Sani Hashim, Buhari Tafida, Habib Saad, provided critical revisions for intellectual content and supervised the methodological framework. All authors have read and approved the final version of the manuscript.

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Conflicts of Interest

The authors declare that they have no competing interests. No financial or personal relationships with people or organizations have inappropriately influenced the research presented in this manuscript.

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