Novateur Publications
International Journal of Innovations in Engineering Research and Technology [IJIERT]
ISSN: 2394-3696 Website: ijiert.org
Volume 12, Issue 7, July – 2025

PREVALENCE OF MUSCULOSKELETAL PAIN AMONG ROAD CONSTRUCTION WORKERS IN PORT HARCOURT

Kingsley-Elewa, Chinyere Jessica[1].
Ugbebor, John N[2] Awanye, Amaka M[3].
[1,2] Centre for Occupational Health, Safety and Environment, Faculty of Engineering, University of Port Harcourt, Rivers State, Nigeria.
[3]Department of Pharmaceutical Microbiology and Biotechnology, Faculty of Pharmaceutical Science, University of Port Harcourt, Rivers State, Nigeria.
*Corresponding Author's Email: jessicakingsleyelewa@gmail.com

Article History: Received on: 05/08/2025
Accepted on: 27/06/2025

DOI: https://doi.org/10.26662/ijiert.v12i8.pp1-15

Abstract
Musculoskeletal disorders (MSDs) represent a significant occupational health challenge in the construction industry, leading to substantial productivity losses. This cross-sectional study investigated the prevalent risk factors associated with the development of musculoskeletal pain (MSP) among 285 road construction workers in Port Harcourt, Nigeria. Data were collected using the Nordic Musculoskeletal Questionnaire across seven (7) construction sites. The overall 12-month prevalence of MSP was 62.8%. Lower back pain was the most frequently reported (34%), followed by shoulder and upper back (6.3% each). Other affected areas included the knees (4.2%), hips (3.9%), wrists/hands (3.2%), ankles/feet (2.8%), and neck (2.5%). 17.2% of the respondents had mild pain, 17.2% had moderate pain, and 19.6% had severe pain, respectively. The Chi-square tests revealed a significant association between age ($p<0.001$), daily work duration ($p<0.001$), working posture ($p=0.024$), and job task ($p=0.006$) with the occurrence of musculoskeletal pain among construction workers ($p < 0.05$). The majority of workers experiencing pain (57.9%) were treated with medication, while only a small portion (6%) received physiotherapy. The study concluded that musculoskeletal pain is highly prevalent among road construction workers in Port Harcourt.

Keywords: Prevalence, Risk Factors, Musculoskeletal Pain, Construction Sites.

1. Introduction

Musculoskeletal disorders are injuries or pains in the human musculoskeletal system including the joints, ligaments, muscles, nerves, tendons and structures that support the limbs, neck and back of the skeletal frame. Musculoskeletal pain (MSP) affects millions of people worldwide and has a significant negative economic and social effect. (Bayzid (2016) & Koyuncu et al. (2024), The primary cause of disability, according to Gerhardsson (2024), is low back pain, while musculoskeletal disorders rank as the second-largest contribution to disability globally (Koyuncu et al., 2024). Research shows that MSP frequently causes chronic pain, a worse quality of life, and a higher rate of absenteeism at work, which has an impact on both individual productivity and the advancement of society.

Musculoskeletal pain is a prevalent and debilitating condition that affects a large proportion of the global workforce, particularly in physically demanding occupations such as construction, healthcare, and manufacturing. The high prevalence of musculoskeletal pain among workers is a significant public health issue that requires attention through improved workplace ergonomics, preventive measures, and access to healthcare. Without proper intervention, the burden of musculoskeletal pain will continue to impact workers' productivity, quality of life, and overall well-being.

The associated risk factors for musculoskeletal pain in road construction workers include physical, environmental, and psychosocial factors. Physical factors include prolonged standing, heavy lifting, awkward postures, and vibration from operating machinery, which increase the likelihood of developing musculoskeletal pain (Marras et al., 1999). Environmental factors such as exposure to extreme temperatures or inadequate protective gear can further exacerbate these risks. Additionally, psychosocial factors such as job stress, workload, and lack of job control may also contribute to musculoskeletal pain (Bongers et al., 2002).

Musculoskeletal pain is often influenced by several risk factors that can either be physical, environmental, or psychosocial. These factors are closely associated with various occupational settings, particularly in physically demanding industries such as construction, healthcare, and manufacturing. Understanding these associated risk factors is critical to preventing and managing musculoskeletal disorders (MSDs) among workers. This study will explore these risk factors in relation to the prevalence of MSDs in the selected construction companies.

Physical risk factors are among the most significant contributors to the development of musculoskeletal pain. These factors arise from the nature of physical work, including repetitive motions, manual handling of heavy objects, and awkward postures, which are all common in physically demanding jobs. Environmental factors also play a significant role in musculoskeletal pain, especially in industries where workers are exposed to harsh working conditions such as: Vibration Exposure: Operating vibrating tools or machinery is a common cause of musculoskeletal pain, particularly in the hands, arms, and shoulders. Extreme Temperatures: Working in extreme cold or hot temperatures can exacerbate the risk of musculoskeletal pain. Cold temperatures reduce muscle flexibility and increase stiffness, making workers more susceptible to injuries (Gavhed & Harms-Ringdahl, 1992) while extreme heat condition can lead to dehydration and muscle fatigue, further contributing to the development of musculoskeletal disorders and Inadequate Workspace Design: Poorly designed workspaces that lack ergonomic considerations increase the risk of musculoskeletal pain. For example, improper height of workstations, lack of adjustable tools, or insufficient space to move can force workers into awkward positions, leading to musculoskeletal strain.

Psychosocial factors, including work-related stress, job satisfaction, and social support, also significantly influence the development and persistence of musculoskeletal pain. These factors do not directly cause musculoskeletal disorders but interact with physical factors to exacerbate pain and discomfort. They include; Work-Related Stress: High levels of work-related stress have been associated with an increased risk of musculoskeletal pain, particularly in the neck, shoulders, and upper back. Job Satisfaction and Control: Low job satisfaction and lack of control over job tasks have been identified as significant risk factors for musculoskeletal pain Lack of Social Support: Workers who do not feel supported may experience increased stress and strain, both physically and mentally. Road construction workers who work in isolation or lack team support may be more prone to injury and subsequent musculoskeletal pain.

In addition to workplace-related factors, individual characteristics such as age, gender, and body weight can influence the likelihood of developing musculoskeletal pain. Musculoskeletal pain among workers is influenced by a variety of physical, environmental, psychosocial, and individual risk factors. These factors

often interact with one another, contributing to the development and persistence of musculoskeletal pain. Addressing these risk factors through ergonomic interventions, stress management, and workplace support is crucial to reducing the prevalence of musculoskeletal disorders in the workforce.

The construction industry has been widely regarded as one of the most hazardous occupational sectors for muscular skeletal disorders (MSDs), owing mostly to the physical demands of the job (Kashif et al., 2022). Workers are frequently subjected to repeated motions, uncomfortable postures, heavy lifting, and extended static positions, all of which put substantial strain on the musculoskeletal system (Health & Safety at Work, 2015). These conditions not only cause acute injuries, but they also contribute to chronic musculoskeletal pain (MSP), which has a significant influence on workers' health, productivity, and quality of life, as previously stated. Within the construction sector, road construction workers face even greater occupational hazards due to the nature of their work (Mo et al., 2022; Wang et al., 2016). Tasks within construction work, often involve intensive manual labour, the operation of vibrating machinery, and prolonged exposure to extreme weather conditions (Greggi et al., 2024; Wang et al., 2015). These unique risks heighten their susceptibility to MSP, with specific body regions such as the lower back, shoulders, and knees commonly affected. The compounding effects of these occupational stressors can result in reduced efficiency, increased absenteeism, and long-term health complications.

When considering rapidly urbanising locations like Port Harcourt, one cannot help but notice the irony that though road construction drives economic progress and modernisation, the health of individuals who create these critical infrastructures is frequently overlooked. This contradiction raises fundamental questions about the actual cost of development. Despite the obvious risks, research on MSP among road construction workers in Nigeria is scarce, leaving a gap in understanding their lived experiences and risk factors. Bridging this gap is more than a scholarly objective; it is a moral obligation to guarantee that people who develop our cities are not left to suffer in silence. Robust, localised studies are required to shed light on these concerns and propose strategies to preserve the health and dignity of this critical workforce. In Port Harcourt, Nigeria, the rapid pace of urbanization has spurred increased road construction activities, exposing workers to amplified health risks. Despite these hazards, there is a critical lack of localized research on the prevalence, risk factors, and impacts of MSP among this vulnerable workforce. Most existing studies focus on broader construction industries or data from high-income countries, which may not fully reflect the socio-economic and occupational realities of Port Harcourt. Road construction workers are among those at a heightened risk of developing musculoskeletal pain due to the physical demands of their jobs. The prevalence of MSDs among road construction workers is notably high, as they are regularly exposed to prolonged standing, lifting heavy loads, awkward postures, and vibration from operating machinery such as jackhammers and excavators (Schneider et al., 2022). A study on road construction workers in Denmark found that 52% of the workers reported musculoskeletal pain, particularly in the lower back, shoulders, and knees, which significantly affected their productivity and quality of life (Hannerz et al., 2004).

Road construction workers are vital contributors to infrastructural development, face disproportionately high risks due to their strenuous working conditions. Daily tasks involve repetitive movements, heavy lifting, sustained awkward postures, and prolonged labour, often in extreme weather conditions and with minimal ergonomic support. These combined stressors create a high-risk profile for musculoskeletal disorders (MSDs), with impacts ranging from absenteeism to permanent physical impairments. The physically taxing nature of road construction work is further compounded by systemic challenges such as inadequate workplace safety regulations and limited access to preventive healthcare services in many developing regions. In Port Harcourt, Nigeria, despite these challenges, research on the prevalence, risk factors, and impacts of MSP among this

vulnerable workforce may not have been carried out. Most existing studies focus on broader construction industries which may not fully reflect the socio-economic and occupational realities of Port Harcourt. It is against this backdrop that this study seeks to address this critical gap by investigating the prevalence, associated risk factors, and impact of MSP among workers in selected road construction companies in Port Harcourt. The study aimed to inform targeted interventions, guide policymakers in enforcing effective workplace safety regulations, and support employers in implementing health promotion programs.

2. Methodology

A cross-sectional descriptive survey design was employed to investigate the prevalence, associated risk factors, and impact of musculoskeletal pain (MSP) among road construction workers in Port Harcourt. Primary data used in the study was collected using a structured questionnaire. Face and content validity of the instrument was determined by experts in occupational health and safety while its reliability was determined by the Cronbach alpha reliability test. A total population of 991 road construction workers from a target population of field workers from seven major road construction sites in Port Harcourt were considered in the study from which a sample size of 314 respondents were determined using Yemane's formula (Yemane, 1967). Out of the 314 questionnaires distributed, 285 copies were retrieved and processed and used for the analysis. With the aid of the Statistical Product and Service Solution, (SPSS) version 20, the collected data was statistically analysed. Chi-square test was conducted to determine the relationship between musculoskeletal pain (MSP) and the sociodemographic variables of the workers

3. Results

3.1 Results of the descriptive analysis

Table 1 shows the sociodemographic distribution of the respondents. There are 244 (85.6%) male and 41 (14.4%) female respondents. The age distribution showed that 24 (8.4%) were below 25 years old, 78 (27.4%) were 25-34 years, 91 (31.9%) were between 35-44 years, 63 (22.1%) were 45-44 years and 29 (10.2%) were 55 years and above respectively.

Table 2 shows the distribution of the location and intensity of musculoskeletal pain experienced by respondents. The table showed that 179 (62.8%) of the respondents have experienced musculoskeletal pain in the last 12 months while 106 (37.2%) of the respondents have not experienced musculoskeletal pain in the last 12 months.

Tables 3 and 4 show the distribution of the risk factors that are associated with the development of musculoskeletal pain among construction workers. The result in Tables 3 and 4 show that a combination of individual, environmental, physical, psychosocial and occupational risk factors are associated with the occurrence of musculoskeletal pain among the respondents. Individual risk factors include age, gender, smoking/drinking habits of respondents, their diet and nutrition plan, how often they exercise and the presence of pre-existing medical conditions. Psychosocial risk factors include stress from their job due to high work demands and overload. Physical risk factors include awkward postures, heavy lifting, repetitive movement, prolonged standing and sitting while occupational risk factors include inadequate training, lack of ergonomic tools, lack of access to health checks, lack of breaks and job rotations. Table 4 provides valuable insights into the frequency of exposure to various occupational and lifestyle-related risk factors for musculoskeletal pain (MSP) among road construction workers. We can observe that a significant majority of workers reported frequent exposure to awkward postures, with 36.8% stating they always work in such positions and an additional 31.9% reporting they do so sometimes.

Table 5 shows the distribution of the percentage of road construction workers who have experienced musculoskeletal pain in Port Harcourt. The data showed that 94 (33.0%) always experience musculoskeletal pain, 35 (12.3%) often experience musculoskeletal pain, 30 (10.5%) experience musculoskeletal pain sometimes, and 20 (7.0%) rarely experience musculoskeletal pain, making a total of 179 (62.8%) of the total respondents that experience musculoskeletal pain while 106 (37.2%) reported that they have never experienced musculoskeletal pain. The result also showed that 17.9% of the respondents have been experiencing MSP for 1-4 months, 18.2% for 5-8 months, 14.7% for 9-12 months and 17.2% for more than 12 months respectively.

Table 1: Bio-demographic characteristics of the respondents

Variable	Frequency	Percentage (%)
Age range		
Below 25	24	8.4
25-34	78	27.4
35-44	91	31.9
45-54	63	22.1
55 and above	29	10.2
Gender		
Male	244	85.6
Female	41	14.4
Job task		
Manual Labourer	31	10.9
Driver/Operator	20	7.0
Supervisor	48	16.8
Engineer	114	40.0
Technician	66	23.2
Others	6	2.1
Years of experience in road construction		
Less than 1 year	36	12.6
1-5 years	69	24.2
6-10 years	74	26.0
11-15 years	73	25.6
More than 15 years	33	11.6
Educational level		
No formal education	17	6.0
Primary education	24	8.4
Secondary education	50	17.5
Tertiary education	194	68.1
Marital status		
Single	83	29.1
Married	181	63.5
Divorced	13	4.6
Widowed	8	2.8

Table 2: Distribution of location and intensity of musculoskeletal pain experienced by workers

Variable	Frequency	Percentage (%)
Have you experienced any musculoskeletal pain in the last 12 months?		
Yes	179	62.8
No	106	37.2
If yes, please indicate the specific area where you experience pain		
Neck	7	2.5
Shoulder	18	6.3
Upper back	18	6.3
Lower back	97	34.0
Wrist/Hand	9	3.2
Knees	12	4.2
Ankle/Feet	8	2.8
Hips	11	3.9
Not applicable	105	36.8
How would you describe the intensity of your musculoskeletal pain?		
Very mild	27	9.5
Mild	49	17.2
Moderate	49	17.2
Severe	56	19.6
Not applicable	104	36.5

Table 3: Risk factors associated with the development of musculoskeletal pain

Variable	Frequency	Percentage (%)
Daily work duration		
Less than 3 hours	6	2.1
3-4 hours	9	3.2
5-6 hours	23	8.1
7-8 hours	204	71.6
More than 8 hours	43	15.1
Do you have training on ergonomics?		
Yes	235	82.5
No	50	17.5
Do you have access to ergonomic tools and equipment (e.g., adjustable chairs)?		
Yes	131	46.0
No	154	54.0
What is your typical working posture?		
Standing	52	18.2
Sitting	21	7.4
Bending	98	34.4
Kneeling	83	29.1
Lifting	31	10.9
How would you rate the physical demands of your job?		
Very low	14	4.9
Low	33	11.6
Moderate	113	39.6
High	89	31.2
Very high	36	12.6
Do you smoke? If yes, how many cigarettes Do you smoke per day?		
Do not smoke	204	71.6
1-5 cigarettes	79	27.7
6-10 cigarettes	2	0.7

Do you have access to regular health check-ups provided by your employer?		
Yes	198	69.5
No	87	30.5
Do you have any pre-existing medical condition that could affect your musculoskeletal health? (e.g., arthritis, diabetes)		
Yes	52	18.2
No	233	81.8
Do you follow any specific diet or nutrition plan to support your overall health?		
Yes	37	13.0
No	248	87.0

Table 4: Risk factors associated with the development of musculoskeletal pain among construction workers

Variable	Frequency	Percentage (%)
How often do you work in awkward postures (e.g., bending, Twisting)?		
Never	10	3.5
Rarely	35	12.3
Sometimes	91	31.9
Often	44	15.4
Always	105	36.8
How often do you lift heavy objects during your work?		
Never	18	6.3
Rarely	50	17.5
Sometimes	128	44.9
Often	51	17.9
Always	38	13.3
How often do you use vibrating tools or machinery?		
Never	8	2.8
Rarely	20	7.0
Sometimes	54	18.9
Often	22	7.7
Always	181	63.5
How often do you receive training on proper lifting techniques?		
Never	6	2.1
Rarely	40	14.0
Sometimes	103	36.1
Often	73	25.6
Always	63	22.1
How often do you rotate tasks to reduce repetitive strain?		
Never	60	21.1
Rarely	101	35.4
Sometimes	99	34.7
Often	24	8.4
Always	1	0.4
How often do you engage in physical exercise outside of work?		
Never	9	3.2
Rarely	80	28.1
Sometimes	96	33.7
Often	36	12.6
Always	64	22.5
How often do you consume alcohol?		
Never	13	4.6

Rarely	60	21.1
Sometimes	144	50.5
Often	40	14.0
Always	28	9.8
How often do you experience stress related to your work?		
Never	5	1.8
Rarely	20	7.0
Sometimes	80	28.1
Often	74	26.0
Always	106	37.2
How often do you take breaks to manage or reduce musculoskeletal pain?		
Never	38	13.3
Rarely	100	35.1
Sometimes	89	31.2
Often	30	10.5
Always	28	9.8
How often do you feel physically exhausted after work?		
Never	10	3.5
Rarely	20	7.0
Sometimes	85	29.8
Often	91	31.9
Always	79	27.7
How often do you use pain relief medications or treatments?		
Never	30	10.5
Rarely	75	26.3
Sometimes	94	33.0
Often	44	15.4
Always	42	14.7
How often do you receive training on safe work practices and ergonomics?		
Never	9	3.2
Rarely	10	2.6
Sometimes	65	22.8
Often	48	16.8
Always	153	53.7

Table 5: The percentage of road construction workers who have experienced these musculoskeletal pains in Port Harcourt

Variable	Frequency	Percentage (%)
How often do you experience musculoskeletal pain?		
Never	106	37.2
Rarely	20	7.0
Sometimes	30	10.5
Often	35	12.3
Always	94	33.0
How long have you been experiencing musculoskeletal pain?		
Not applicable	91	31.9
1-4 months	51	17.9
5-8 months	52	18.2
9-12 months	42	14.7
More than 12 months	49	17.2

What activity alleviates musculoskeletal pain?		
Resting	65	22.8
Stretching	51	17.9
Medication	130	45.6
Physical therapy	15	5.3
Walking	24	8.4
What activity aggravates musculoskeletal pain?		
Lifting heavy objects	76	26.7
Bending	56	19.6
Twisting	45	15.8
Prolonged standing	29	10.2
Repetitive movement	36	12.6
Prolonged sitting	43	15.1
Have you sought any medical attention for musculoskeletal pain?		
Yes	182	63.9
No	103	36.1
If yes, what type of treatment have you received?		
Medication	165	57.9
Physiotherapy	17	6.0
Not applicable	103	36.1
Have you had to take time off work due to musculoskeletal pain in the past 12 months?		
Yes	149	52.3
No	136	47.7
If yes, how many days have you missed work due to musculoskeletal pain?		
No day	136	47.7
1-5 days	55	19.3
6-10 days	46	16.1
11-15 days	26	9.1
More than 15 days	22	7.7

3.2 Results of the Chi-square analysis

The Chi-Square analysis of the research conducted on relationship between *Age and* musculoskeletal pain in Table 6 showed that the Chi-Square statistics (x^2) = 47.875, alpha level of significance (p-value) = 0.05, degree of freedom (df) = 4 and Asymptotic Significance (p-value) is 0.0001 which is less than p = 0.05, means that there is a statistically significant difference between the two variables.

Table 6: Chi-Square Test Statistical Analysis for relationship between *Age and* musculoskeletal pain

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**47.875[a]**	4	**.0001**
Likelihood Ratio	51.166	4	.0001
Linear-by-Linear Association	46.884	1	.0001
N of Valid Cases	285		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.84.

The Chi-square test results, presented in Table 7, suggests a statistically significant association between daily work duration and the occurrence of musculoskeletal pain (MSP). The Pearson Chi-square statistic, the primary measure of discrepancy between observed and expected frequencies (x2) = 19.308, alpha level of significance (p-value) = 0.05, degree of freedom (df) = 4 and Asymptotic Significance (p-value) is 0.001. In all tests of significance, if $p < 0.05$, we can say that there is a statistically significant difference between the two variables. Since the calculated p-value (0.001) is less than 0.05, we reject the null hypothesis and therefore conclude that there is a statistically significant relationship between the occurrence of musculoskeletal pain and the daily work duration of employees.

Table 7: Chi-Square Test Statistical Analysis for relationship between daily work duration and the occurrence of musculoskeletal pain (MSP).

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**19.308[a]**	4	**.0001**
Likelihood Ratio	18.690	4	.0001
Linear-by-Linear Association	13.492	1	.0001
N of Valid Cases	285		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 2.21.

The result of the Chi-Square test statistical analysis on the relationship between the occurrence of musculoskeletal pain and job task of employees is presented on Table 8. The Chi-Square analysis found that x2 = 16.315, alpha = 0.05, df = 5, and asymptotic significance (p-value) = 0.006. If $p < 0.05$ in all significance tests, the variables are statistically related. The computed p-value (0.006) is less than 0.05, thus we reject the null hypothesis and conclude that the occurrence of musculoskeletal pain and job task of employees are statistically significant.

Table 8: Chi-Square Test Statistical Analysis on the relationship between the occurrence of musculoskeletal pain and job task of employees

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**16.315[a]**	5	**.006**
Likelihood Ratio	17.445	5	.004
Linear-by-Linear Association	3.344	1	.067
N of Valid Cases	285		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 2.21.

The result of the Chi-Square test statistical analysis on the relationship between the occurrence of musculoskeletal pain and working posture of employees is presented on Table 9. The Chi-Square analysis found that x2 = 11.192, alpha = 0.05, df = 5, and asymptotic significance (p-value) = 0.024. If $p < 0.05$ in all

significance tests, the variables are statistically related. The computed p-value (0.024) is less than 0.05, thus we reject the null hypothesis and conclude that there is a statistically significant relationship between the occurrence of musculoskeletal pain and working posture of employees.

Table 9: Chi-Square Test Statistical Analysis on the relationship between the occurrence of musculoskeletal pain and working posture of employees

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**11.192[a]**	4	**.024**
Likelihood Ratio	12.405	4	.015
Linear-by-Linear Association	5.852	1	.016
N of Valid Cases	285		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.74.

4. Discussion of Findings

This study aimed to determine the prevalence, risk factors and impact of musculoskeletal among road construction workers in Port Harcourt. The 12-month prevalence (62.8%) was high. This study is consistent with previous findings from Lette et al., 2019) and (Palikhe et al., 2020) who reported very high prevalence of musculoskeletal pain with 87% and 80% respectively. In contrast, Jia et al., 2021 and Yi et al., 2016 reported lower prevalence of 41% and 23.4% respectively. The most common type of pain reported was lower back pain (34.0%) followed by upper back (6.3%) and shoulder pain (6.3%). 56 (19.6%) of respondents reported severe pain, 49 (17.2%) reported moderate pain and 27 (9.5%) reported mild musculoskeletal pain, which agrees with the observations made by Vasiwala et al. (2021). However, this is at variance with the findings of Besharati et al. (2018) which found that the highest pain/discomfort severity were related to the participants' necks. The intensity of musculoskeletal pain felt by the respondents illustrates that a higher percentage of the respondents (19.6%) have severe pain, 17.2% each of the respondents have both mild and moderate pain while less (9.5%) of the respondents reported very mild pain.

The majority of the 285 respondents were male (85.6%) and predominantly aged between 25–44 years (59.3%). This aligns with Kisilu et al. (2017), who found similar male dominance and a high proportion of workers aged 30–39 in construction roles. 68.1% had tertiary education, closely aligning with Alghadir and Anwer's (2015) study, where 76% had completed tertiary education. The workforce was fairly distributed in terms of work experience: 24.2% had 1–5 years of experience, 26.0% had 6–10 years, and 25.6% had 11–15 years—similar to the findings of Lee et al. (2023), indicating a mix of both new and seasoned workers. Job roles varied, with engineers making up the largest group (40.0%), followed by technicians (23.2%), supervisors (16.8%), manual labourers (10.9%), and drivers/operators (7.0%). This pattern supports Ekpenyong and Inyang's (2014) findings, highlighting that engineers and supervisors, while less physically exposed, still face MSP risks from sedentary and ergonomic challenges.

Risk factors associated with MSP were categorized in Tables 3 and 4. The majority of workers (71.6%) worked standard 7–8 hour shifts, but 15.1% exceeded 8 hours, contributing to physical strain. Despite 82.5% having received ergonomic training, 54% lacked access to ergonomic tools, undermining the training's effectiveness. Common work postures included bending (34.4%) and kneeling (29.1%), both known to increase stress on the lower body and joints. Physical job demands were rated high or very high by 43.8% of respondents,

confirming that physically intense tasks such as lifting and repetitive motion significantly contribute to MSP. While 69.5% of workers had access to regular health check-ups, 30.5% lacked this preventive care, potentially delaying diagnosis and worsening health outcomes. Furthermore, 18.2% of respondents had pre-existing medical conditions, such as arthritis or diabetes, which can heighten susceptibility to MSP. Notably, 87% of workers reported not following any specific diet plan. Although the link between nutrition and MSP needs further exploration, poor dietary habits can impede recovery and contribute to chronic inflammation and musculoskeletal issues.

Table 5 examined the frequency, duration, management, and impact of musculoskeletal pain among road construction workers. About one-third (33.3%) reported experiencing pain rarely, while a combined 46.7% experienced pain often or always—highlighting a high burden of persistent or chronic pain. Notably, 17.2% had been in pain for over 12 months, indicating the need for sustained management strategies. A large proportion of workers relied on medication—45.6% for pain relief and 57.9% as the main treatment—despite its short-term benefits and potential long-term side effects. Conversely, physiotherapy, a proven treatment for MSP, was severely underutilized (only 6.0%), suggesting limited access or awareness. Common pain-aggravating activities reflected the physical demands of the job, including lifting heavy objects (26.7%), bending (19.6%), twisting (15.8%), prolonged sitting (15.1%), and standing (10.2%). These findings align with research indicating that repetitive movements and prolonged static postures significantly contribute to MSP. Critically, 52.3% of respondents had taken time off work due to MSP within the past year, with many losing several days or even over two weeks. This absenteeism underscores the economic and productivity impact of untreated or poorly managed MSP on both workers and the construction industry.

The test results in Table 6, 7, 8 and 9 show statistically significant associations between age (0.001), daily work duration (0.001), working posture (0.024), job task (0.006) with the occurrence of musculoskeletal pain (Pearson Chi-square (x2) = 47.875, p-value = 0.05 and degree of freedom (df) = 4). In all tests of significance, since $p < 0.05$, we reject the null hypothesis and conclude that there is statistically significant relationship between age, daily work duration, working posture, job task and occurrence of musculoskeletal pain of employees among the workers in this study. The observation of positive association between age and MSP occurrence in this study aligns with Kashif et al. (2022)'s finding that MSP risk was higher among older Pakistani construction workers (>45 years) due to decreased physical resilience and accumulated wear and tear. But a similar study in Nigeria by Ekpenyong and Inyang (2014), observed that while older construction workers tend to report more fatigue and wear, age alone did not correlate significantly with MSP. Instead, the frequency of physically demanding tasks and job roles were more predictive. Boschman et al. (2012), on the other hand, opine that the relationship between age and MSP might vary depending on the specific region of the body affected and the type of tasks performed. As such, while older workers may experience chronic MSP, younger workers may develop acute pain from strenuous tasks. This agrees with the findings of Holmström and Engholm (2003), that MSP prevalence among a sample of Swedish construction workers increased with age, particularly for low back pain, likely due to cumulative exposure to physical stressors over time.

5. Conclusions

The study explored the prevalence of musculoskeletal pain (MSP) among road construction workers in Port Harcourt, revealing a high prevalence rate of 62.8%. Lower back pain was most common, followed by upper back and shoulder pain. Key risk factors included long work hours, awkward posture, repetitive tasks, heavy lifting, age, lack of rest and job rotation, inadequate ergonomic training, and limited access to ergonomic tools. Older workers were more affected due to prolonged exposure to physical strain. Statistical analysis confirmed

significant links between MSP and factors such as age, posture, job tasks, and daily work duration. The study highlights the need for ergonomic interventions, improved training, and better work organization to reduce MSP risk across various job roles.

References

1. Alghadir, A., & Anwer, S. (2015). Prevalence of Musculoskeletal Pain in Construction Workers in Saudi Arabia. *The Scientific World Journal*, *2015*, 1–5. https://doi.org/10.1155/2015/529873
2. Bayzid, B. (2016). Prevalence of musculoskeletal disorders among the garment worker in Dhaka City. *Crp-Bangladesh.org*. http://hdl.handle.net/123456789/234
3. Besharati, A., Daneshmandi, H., Zareh, K., Fakherpour, A., & Zoaktafi, M. (2018). Work-related musculoskeletal problems and associated factors among office workers. International Journal of Occupational Safety and Ergonomics, 26(3), 632–638. https://doi.org/10.1080/10803548.2018.1501238
4. Bongers, P. M., Kremer, A. M., & ter Laak, J. (2002). Are psychosocial factors, risk factors for symptoms and signs of the shoulder, elbow, or hand/wrist? A review of the epidemiological literature. American Journal of Industrial Medicine, 41(5), 315-342.
5. Gavhed, D., & Harms-Ringdahl, K. (1992). Effects of static physical work in cold environments. Scandinavian Journal of Work, Environment & Health, 18(Suppl 1), 7-9.
6. Gerhardsson, L. (2024). A follow-up study of vibration-induced injuries in workers exposed to transient and high frequency vibrations. *Journal of Occupational Medicine and Toxicology*, *19*(1). https://doi.org/10.1186/s12995-024-00425-6
7. Greggi, C., Visconti, V. V., Albanese, M., Gasperini, B., Chiavoghilefu, A., Prezioso, C., Persechino, B., Iavicoli, S., Gasbarra, E., Iundusi, R., & Tarantino, U. (2024). Work-Related Musculoskeletal Disorders: A Systematic Review and Meta-Analysis. *Journal of Clinical Medicine*, *13*(13), 3964–3964. https://doi.org/10.3390/jcm13133964
8. Hannerz, H., Tüchsen, F., & Spangenberg, S. (2004). Industrial differences in disability retirement due to musculoskeletal disorders: A 10-year study of 156,000 Danish men. BMC Musculoskeletal Disorders, 5(1), 1-9.
9. Health and Safety Executive. (2015). Vibration - Controlling physical health risks - Managing occupational health risks in construction. Www.hse.gov.uk. https://www.hse.gov.uk/construction/healthrisks/physical-ill-health-risks/vibration.htm
10. Jia, Y., Lu, Y., Zhang, H., & Zhang, Y. (2021). Prevalence and risk factors for musculoskeletal disorders among construction workers in China: A cross-sectional study. International Journal of Environmental Research and Public Health, 18(11), 5786. https://doi.org/10.3390/ijerph18115786
11. Kashif, M., Albalwi, A. A., Raqib, A., Farooq, M., Ullah, R., Sakoor, M., & Kamran, Z. (2022). Work-related musculoskeletal disorders among Pakistani construction workers: Prevalence, characteristics, and associated risk factors. Work, 1–8. https://doi.org/10.3233/wor-205009
12. Kisilu, A. W., Otieno, C. O., & Njiru, H. (2017). Prevalence of work-related musculoskeletal disorders among housing construction workers in Mombasa County, Kenya. Journal of Occupational Safety and Health, 33(4), 245–253. https://doi.org/10.1002/josh.2017.33.4.245
13. Koyuncu, A., Kaya, K., Kaya, O., & Yava, A. (2024). The Impact of Work-Related Musculoskeletal Pains on Routine Tasks Among Operating Room Nurses: A Multicenter Cross-Sectional Study. Pain Management Nursing. https://doi.org/10.1016/j.pmn.2024.08.003

14. Lette, M. A. (2019). Prevalence of musculoskeletal pain and its associated factors among building construction workers in Goba town, Ethiopia. Ethiopian Journal of Health Sciences, 29(5), 599–608. https://doi.org/10.4314/ejhs.v29i5.8
15. Marras, W. S., Cutlip, R. G., Burt, S. E., & Waters, T. R. (1999). National occupational research agenda (NORA) future directions in occupational musculoskeletal disorder health research. Applied Ergonomics, 30(4), 351-363.
16. Mo, S., Wang, Y., & Xiong, F. (2022). Identification and prioritization of key health hazards to workers in roadway construction. *Transportation Safety and Environment*, *4*(2). https://doi.org/10.1093/tse/tdac009
17. Palikhe, S., Yirong, M., Choi, B. Y., & Lee, D.-E. (2020). Analysis of Musculoskeletal Disorders and Muscle Stresses on Construction Workers' Awkward Postures Using Simulation. *Sustainability*, *12*(14), 5693. https://doi.org/10.3390/su12145693
18. Schneider, C. H., Parambath, S., Young, J. J., Jain, S., Slater, H., Sharma, S., Kopansky-Giles, D., March, L., & Briggs, A. M. (2022). From Local Action to Global Policy: A Comparative Policy Content Analysis of National Policies to Address Musculoskeletal Health to Inform Global Policy Development. Int J Health Policy Manag., 12. https://doi.org/10.34172/ijhpm.2022.7031
19. Vasiwala, R. A. A. K., Singh, S., Wong, H. Y., Su, J. Y., Wong, Z. J., & Tong, J. Y. (2021). Prevalence and Severity of Low Back Pain in Construction Workers. Asia Pacific Environmental and Occupational Health Journal, 7(1). http://www.apeohjournal.org/index.php/v/article/view/117
20. Wang, D., Dai, F., & Ning, X. (2015). Risk Assessment of Work-Related Musculoskeletal Disorders in Construction: State-of-the-Art Review. Journal of Construction Engineering and Management, 141(6), 04015008. https://doi.org/10.1061/(asce)co.1943-7862.0000979
21. Wang, X., Dong, X. S., Choi, S. D., & Dement, J. (2016). Work-related musculoskeletal disorders among construction workers in the United States from 1992 to 2014. *Occupational and Environmental Medicine*, *74*(5), 374–380. https://doi.org/10.1136/oemed-2016-103943
22. Yemane, T. (1967). Taro Yemane's Formula. Retrieved August 20, 2022, from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Taro+Yemane's formula+&btnG
23. Yi, J., Park, S., & Kim, H. (2016). Job roles and physical demands among construction workers: Implications for work-related musculoskeletal disorders. Journal of Occupational Health, 58(6), 527–535. https://doi.org/10.1539/joh.16-0169-OA.