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Prevalence and Anatomical Distribution of Work-Related Musculoskeletal Disorders Among Petrol Station Attendants in Maiduguri, Nigeria

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Abstract

Introduction: Work-related musculoskeletal disorders (WMSDs) are common occupational health conditions associated with repetitive tasks, prolonged standing, and awkward postures. Petrol station attendants may be particularly vulnerable due to the physical demands of fuel dispensing activities. This study determined the prevalence, anatomical distribution, and associated occupational factors of WMSDs among petrol station attendants in Maiduguri, Nigeria. **Methods:** A cross-sectional survey was conducted among petrol station attendants using a multistage sampling technique. Data were collected using the Nordic Musculoskeletal Questionnaire (NMQ). Of 200 questionnaires distributed, 150 completed responses were analyzed (response rate: 75%). Descriptive statistics and chi-square tests were employed for analysis, with statistical significance set at $p < 0.05$. **Results:** The 12-month prevalence of WMSDs was 68.0% (102/150). The most affected body regions were the shoulder (45.3%), wrist/hand (37.3%), and neck (34.3%). A statistically significant association was observed between WMSD prevalence and years of work experience ($\chi^2 = 24.97, p < 0.001$). The majority of participants (71.6%) reported no prior ergonomic training. **Conclusion:** WMSDs are highly prevalent among petrol station attendants in Maiduguri. Occupational exposures such as repetitive tasks and prolonged standing may contribute to this burden. Implementation of workplace ergonomic interventions and occupational health education is recommended to reduce risk and improve worker well-being.

Keywords: work-related musculoskeletal disorders; occupational health; petrol station attendants; Nordic Musculoskeletal Questionnaire; Nigeria

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Introduction

Work-related musculoskeletal disorders (WMSDs) represent one of the most common occupational health problems affecting workers worldwide Dan-Inu et al., 2025. These disorders involve injuries or dysfunctions of the muscles, tendons, ligaments, joints, nerves, and supporting structures that arise from or are aggravated by work-related activities Kuorinka et al., 1987. WMSDs are frequently associated with repetitive movements, awkward postures, prolonged static positions, and excessive mechanical loading, all of which may lead to pain, reduced functional capacity, and decreased work productivity.

Globally, musculoskeletal disorders constitute a major cause of disability and reduced quality of life among working populations. The Global Burden of Disease study has consistently identified musculoskeletal conditions as leading contributors to years lived with disability worldwide. In occupational settings, WMSDs account for a substantial proportion of work-related illnesses and

absenteeism, resulting in considerable economic losses and reduced workforce productivity Punnett & Wegman, 2004; Takala et al., 2021. The financial burden associated with WMSDs includes direct medical costs as well as indirect costs related to lost productivity, compensation claims, and workforce turnover.

In developing countries, the burden of WMSDs is often exacerbated by poor workplace ergonomics, inadequate occupational health policies, and limited awareness of preventive measures. Workers in the informal and service sectors are particularly vulnerable due to limited regulation and restricted access to occupational health services Adegoke et al., 2008. In many African countries, including Nigeria, occupational health research has largely focused on healthcare professionals and industrial workers, with relatively little attention given to other service-sector occupations that may also be exposed to significant musculoskeletal risks.

Petrol station attendants represent an occupational group that may be at increased risk of developing WMSDs due to the physical demands associated with their work. Their job tasks commonly involve prolonged standing, repetitive upper limb movements, bending, reaching, and handling fuel dispensing equipment. These activities expose workers to biomechanical stress that can contribute to musculoskeletal discomfort and injury over time Ferreira & Freire, 2001. In addition, factors such as long working hours, high customer turnover, and limited rest breaks may further increase the risk of musculoskeletal strain.

Previous studies conducted in different occupational settings have reported high prevalence of WMSDs among workers exposed to repetitive or physically demanding tasks. For instance, studies among healthcare workers and sewing machine operators in Nigeria have documented significant levels of musculoskeletal complaints involving the lower back, shoulders, and upper limbs Maduagwu et al., 2015; Tinubu et al., 2010. Similarly, research among filling station attendants in Lagos, Nigeria, reported a high prevalence of low back pain and upper limb musculoskeletal symptoms, highlighting occupational risks associated with fuel dispensing activities Akodu et al., 2016.

Evidence from other occupational groups in Nigeria has also demonstrated a substantial burden of WMSDs. For example, Dan-Inu et al. (2025) reported a high prevalence of WMSDs among aluminum workers in Maiduguri, with the lower back, neck, and shoulders being the most commonly affected regions. These findings highlight the significant role of occupational ergonomic exposures in the development of musculoskeletal disorders among workers engaged in physically demanding activities.

Despite the growing recognition of occupational musculoskeletal disorders, there remains a paucity of research focusing on petrol station attendants in northern Nigeria, particularly in Maiduguri, Borno State. Understanding the prevalence and distribution of WMSDs among this occupational group is important for informing workplace health interventions and occupational safety policies.

Therefore, this study aimed to determine the prevalence, anatomical distribution, and associated factors of work-related musculoskeletal disorders among petrol station attendants in Maiduguri, Nigeria. The findings may provide evidence to support the development of ergonomic interventions and occupational health programs aimed at reducing the burden of WMSDs among petrol station workers.

Methods

Study Design and Setting

This study employed a cross-sectional survey design to investigate the prevalence, patterns, and associated factors of work-related musculoskeletal disorders (WMSDs) among petrol station attendants in Maiduguri, Borno State, Nigeria.

Study Population and Eligibility Criteria

The study population comprised petrol station attendants working in registered filling stations within Maiduguri. Participants who had at least one year of work experience and were willing to participate were included in the study. Petrol attendants who were unwilling to participate, had less than one year of work experience, reported pre-existing musculoskeletal disorders unrelated to occupational activities, or were pregnant at the time of the study were excluded.

Sampling Technique

A multi-stage sampling technique was employed. In the first stage, 100 filling stations were randomly selected from approximately 400 registered filling stations in Maiduguri using simple random sampling. In the second stage, eligible and consenting petrol station attendants within each selected filling station were recruited using convenience sampling until the required sample size was achieved.

Sample Size Determination

The sample size was determined using Daniel's formula for cross-sectional studies at a 95% confidence level ($\alpha = 0.05$) Daniel, 1999, yielding a minimum sample size of 200 participants. Of these, 150 participants completed and returned the questionnaire, resulting in a response rate of 75%, which was considered adequate for analysis.

Data Collection Instrument

Data were collected using the Standardized Nordic Musculoskeletal Questionnaire (NMQ), a validated instrument designed to assess musculoskeletal symptoms and the prevalence of WMSDs in occupational populations Kuorinka et al., 1987. The NMQ has been widely used in similar studies in Nigeria Adegoke et al., 2008; Maduagwu et al., 2015; Saidu et al., 2011; Tinubu et al., 2010.

The questionnaire consisted of four sections: Section A captured socio-demographic characteristics; Section B assessed the prevalence of musculoskeletal symptoms across ten anatomical regions; Section C evaluated perceived occupational risk factors; and Section D explored coping strategies adopted by workers. Participants were guided during questionnaire administration where necessary, and a Hausa-translated version was provided for respondents who could not read or understand English. However, the translated version was not formally tested for reliability, which is acknowledged as a limitation of the study.

Validity and Reliability of Instrument

The Nordic Musculoskeletal Questionnaire has demonstrated acceptable psychometric properties, with reported sensitivity ranging from 82.7% to 100% and specificity between 51.1% and 82.4% Descatha et al., 2007, supporting its suitability for occupational health research.

Ethical Considerations

Ethical approval was obtained from the Ethical Committee of the University of Maiduguri Teaching Hospital (Approval No: 13/01/08/030) prior to data collection. Permission to conduct the study was also obtained from the managers of selected filling stations through an official letter issued by the Head of the Department of Medical Rehabilitation, University of Maiduguri. Written informed consent was obtained from all participants, and confidentiality of the information provided was strictly maintained.

Data Analysis

Data were analyzed using *IBM SPSS Statistics* version 20. Descriptive statistics, including mean, standard deviation, frequencies, and percentages, were used to summarize socio-demographic characteristics as well as the prevalence, patterns, and risk factors of WMSDs. Inferential statistics were performed using the Chi-square test to determine associations between WMSD prevalence and selected variables such as age, gender, years of work experience, daily working hours, and educational level. A p-value of less than 0.05 was considered statistically significant.

Results

Sociodemographic Characteristics

A total of 200 copies of the Nordic Musculoskeletal Questionnaire were distributed. However, 12 individuals did not meet the inclusion criteria, and 38 petrol attendants declined participation due to reasons including lack of time, fatigue, and lack of incentives. Consequently, 150 petrol attendants were included in the study.

As shown in Table 1, 77.3% of participants were male and 22.7% were female, with a mean age of 29.20 $\pm$ 7.45 years. More than half of the respondents (55.3%) had attained secondary education, while 16.0% had tertiary-level education. Regarding work experience, the majority (60.7%) had been employed for 1–5 years, whereas only 8.0% had over 11 years of work experience. Additionally, most participants (94.0%) reported working 6–10 hours per day, while 6.0% worked more than 11 hours daily.

Prevalence and Patterns of Work-Related Musculoskeletal Disorders

The 12-month prevalence of work-related musculoskeletal disorders (WMSDs) among participants was 68.0% (102/150). Over the preceding 12 months, the shoulder was the most affected body region (45.3%), followed by the wrist/hand (37.3%) and neck (34.3%), while the least affected region was the feet (5.9%).

The 7-day prevalence of WMSDs was 30.7% (46/150). Within the past 7 days, the shoulder remained the most commonly affected body region (41.1%), followed by the elbow (26.5%), whereas the hip was the least affected region (3.9%). Detailed prevalence by anatomical region is presented in Table 2.

Association Between WMSDs and Sociodemographic Characteristics

There was no statistically significant association between 12-month WMSD prevalence and age group, gender, or daily working hours. However, a statistically significant association was observed between WMSD prevalence and years of work experience ($\chi^2 = 24.972, p < 0.001$), as well as educational level ($\chi^2 = 9.842, p = 0.020$).

Furthermore, 78.4% ($n = 80$) of petrol attendants reported experiencing WMSDs within their first year of work. A majority (89.2%) reported a gradual onset of symptoms. Seventy participants (68.6%) had received or were currently receiving treatment for WMSDs. Among those receiving treatment, medications were the most commonly used intervention (75.8%), with doctors being the primary prescribers (31.4%). Additionally, a large proportion of participants (71.6%) had never received ergonomic training, as shown in Table 3.

Risk Factors and Coping Strategies Among Petrol Attendants

The most commonly reported risk factor for WMSDs was attending to a large number of customers in a single day (53.0%), followed by performing repetitive tasks (51.0%). The least commonly reported risk factor was working many days per week (6.9%).

Regarding coping strategies, adjusting the chair was the most frequently adopted strategy (57.8%), followed by taking regular pauses to stretch (55.9%). The least adopted strategies were taking a break from work for the day (9.8%) and seeking medical attention (11.8%), as shown in Table 4

Table 1: Sociodemographic Characteristics of Participants ($n = 150$)

Characteristic	Frequency (n)	Percentage (%)
Age (years)		
Mean age (± SD)	29.20 ± 7.45	
20–29	95	63.3
30–39	45	30.0
40–49	7	4.7
≥50	3	2.0
Gender		
Male	116	77.3
Female	34	22.7
Marital Status		
Single	77	51.3
Married	67	44.7
Divorced	6	4.0
Educational Level		
No formal education	31	20.7
Primary	12	8.0
Secondary	83	55.3
Tertiary	24	16.0
Work Experience		
1–5 years	91	60.7
6–10 years	47	31.3
≥11 years	12	8.0
Work Hours/Day		
6–10 hours	141	94.0
≥11 hours	9	6.0

Table 2: Prevalence of Work-Related Musculoskeletal Disorders by Body Region Among Participants ($n = 150$)

Body Region	12-Month Prevalence n (%)	7-Day Prevalence n (%)
Neck	35 (34.3)	25 (24.5)
Shoulder	56 (45.3)	42 (41.1)
Elbow	27 (26.5)	27 (26.5)
Wrist/Hand	38 (37.3)	24 (23.5)
Upper Back	13 (13.0)	8 (7.8)
Lower Back	27 (26.5)	23 (22.5)
Hip	9 (8.8)	4 (3.9)
Knee	11 (10.8)	6 (5.9)
Ankle/Feet	6 (5.9)	4 (3.9)

Discussion

This study investigated the prevalence, anatomical distribution, and associated factors of work-related musculoskeletal disorders (WMSDs) among petrol station attendants in Maiduguri, Nigeria. The findings revealed a high prevalence of WMSDs among the participants, with 68% of respondents reporting musculoskeletal symptoms within the previous 12 months. This highlights the substantial occupational health burden experienced by petrol station attendants, a workforce that is often overlooked in occupational health research.

The prevalence observed in the present study is comparable with findings from previous studies conducted in similar occupational settings. Studies among petrol station attendants and other service-sector workers in developing countries have reported WMSD prevalence rates ranging from 60% to 75%, largely attributed to repetitive work tasks, prolonged standing, and awkward working postures Chiwaridzo et al., 2018; Ndejjo et al., 2020. Similarly, research conducted among filling station attendants in Lagos, Nigeria, reported a high prevalence of musculoskeletal complaints, particularly involving the lower back and upper limbs Akodu et al., 2016. The high prevalence observed in this study is also consistent with findings from other occupational groups exposed to physically demanding tasks. For instance, Dan-Inu et al. (2025) reported a prevalence of 62.3% among aluminum workers in Maiduguri, with the lower back and neck being the most affected regions. These similarities suggest that occupations characterized by repetitive movements and prolonged standing may predispose workers to musculoskeletal disorders.

Regarding anatomical distribution, the shoulder emerged as the most commonly affected body region, followed by the wrist/hand and neck. This finding is consistent with studies examining occupations that require repetitive upper-limb activities. Repeated reaching, lifting fuel pump nozzles, and maintaining static arm positions during fuel dispensing may place considerable strain on the shoulder and upper extremities. Previous studies among hairdressers, sewing machine operators, and retail workers have also reported high prevalence of shoulder and upper limb musculoskeletal symptoms due to repetitive tasks and sustained postures Maduagwu et al., 2015; Mussi & Gouveia, 2008. In contrast, studies among nurses and manual laborers often report the lower back as the most affected region, suggesting that anatomical distribution varies depending on occupational biomechanical demands Tinubu et al., 2010.

The present study identified a significant association between years of work experience and WMSD prevalence. Petrol station attendants with fewer years of work experience (1–5 years) reported higher prevalence of musculoskeletal symptoms compared with those with longer work experience. This may reflect inadequate adaptation to occupational demands or limited ergonomic awareness among newer workers. Similar findings have been reported in previous studies, where early-career workers were more vulnerable due to lack of experience and protective work strategies Vieira & Kumar, 2004. However, prolonged exposure to physically demanding tasks may also lead to cumulative musculoskeletal strain over time Punnett & Wegman, 2004. Therefore, both early-career and long-term workers may benefit from targeted occupational health interventions.

Educational level was also significantly associated with WMSD prevalence. Participants with lower educational attainment reported higher prevalence of musculoskeletal symptoms. This may be related to limited awareness of occupational risk factors, ergonomic practices, and preventive strate-

Table 3: Association Between Prevalence of Work-Related Musculoskeletal Disorders and Sociodemographic Characteristics

Characteristic	Category	WMSDs n	(%)	χ^2 / p-value
Age (years)	20–29	65	63.7	
	30–39	31	30.4	7.14 / 0.18
	≥40	6	5.9	
Gender	Male	79	77.5	1.22 / 0.27
	Female	23	22.5	
Educational level	None	21	20.6	
	Primary	8	7.8	
	Secondary	56	54.9	9.84 / 0.02
	Tertiary	16	15.7	
	Others	1	1.0	
Work experience (years)	1–5	62	60.8	
	6–10	32	31.4	24.97 / < 0.001
	≥11	8	7.8	
Work hours/day	6–10	96	94.1	0.53 / 0.47
	≥11	6	5.9	

Note: χ^2 = Chi-square statistic; $p < 0.05$ considered statistically significant.

Table 4: Coping Strategies Reported by Petrol Station Attendants ($n = 150$)

Coping Strategy	Almost Always n (%)	Sometimes n (%)	Almost Never n (%)
I get someone else to help me	29 (28.4)	64 (62.7)	8 (7.8)
I change my posture regularly	53 (52.0)	45 (44.1)	4 (3.9)
I pause regularly so I can stretch	57 (55.9)	40 (39.2)	5 (4.9)
I adjust my chair	59 (57.8)	37 (36.3)	7 (6.9)
I select work that will not aggravate discomfort	48 (47.1)	44 (43.1)	10 (9.8)
I stop the work if it aggravates discomfort	53 (52.0)	41 (40.2)	8 (7.8)
I take a break from work for the day	13 (12.7)	37 (36.3)	52 (51.0)
I take a break for a couple of days	10 (9.8)	27 (26.5)	65 (63.7)
I seek medical attention	12 (11.8)	79 (77.4)	11 (10.8)

Note: Values are presented as frequency (n) and percentage (%).

gies. Similar findings have been reported among workers in developing countries, where limited occupational health knowledge contributes to increased WMSD risk Dagne et al., 2020. Improving occupational health literacy may therefore help reduce the burden of WMSDs.

The majority of participants reported working between six and ten hours daily, reflecting extended work schedules common in service-sector occupations. Prolonged working hours combined with repetitive tasks may contribute to sustained biomechanical stress. Additionally, most respondents reported lack of ergonomic training, indicating a gap in workplace health education. Previ-

ous studies have demonstrated that ergonomic interventions and workplace modifications can significantly reduce musculoskeletal disorders among workers Forde et al., 2021.

Despite the high prevalence of musculoskeletal symptoms, relatively few participants reported seeking professional medical care. Many relied on self-management strategies such as posture adjustment and brief rest periods. While these may provide temporary relief, they do not address underlying ergonomic risks. This finding underscores the need for improved access to occupational health services, including physiotherapy and ergonomic training programs.

Overall, the findings of this study indicate that petrol station attendants represent a vulnerable occupational group for WMSDs. The repetitive nature of fuel dispensing tasks, prolonged standing, and limited ergonomic awareness contribute to the high prevalence observed. Addressing these risk factors through targeted workplace interventions could significantly improve workers' health and productivity.

Limitations

Several limitations should be considered when interpreting these findings. First, the cross-sectional design precludes causal inference between occupational exposures and work-related musculoskeletal disorders (WMSDs). Second, the use of convenience sampling may introduce selection bias and limit the generalizability of the findings. Third, musculoskeletal symptoms were self-reported, which may be subject to recall bias. Fourth, the Hausa-translated version of the questionnaire was not formally validated, which may affect measurement reliability. Finally, the study did not include clinical examinations to confirm reported musculoskeletal disorders.

Clinical Implications

The findings of this study underscore the need for targeted occupational health interventions among petrol station attendants. Physiotherapists and occupational health professionals can play a key role in prevention by providing ergonomic education, promoting workplace stretching programs, and advising on appropriate workstation modifications. Implementing such interventions may help reduce the burden of WMSDs and improve workers' functional capacity and productivity.

Conclusion

This study demonstrates a high prevalence of work-related musculoskeletal disorders among petrol station attendants in Maiduguri, with the shoulder, wrist/hand, and neck being the most commonly affected regions. Years of work experience and educational level were significantly associated with WMSD prevalence. These findings highlight the need for ergonomic interventions, occupational health education, and workplace policies aimed at reducing musculoskeletal strain and improving occupational health outcomes among petrol station attendants.

Recommendations

This study recommends that employers implement regular ergonomic training programs focusing on proper posture, task rotation, and workstation adjustments to minimize repetitive strain. Petrol station attendants should have access to physiotherapy and occupational health services to facilitate early diagnosis and management of WMSDs. Workstations should be ergonomically designed to reduce repetitive overhead reaching and support optimal posture. Furthermore, longitudinal studies are recommended to assess the long-term impact of WMSDs and evaluate the effectiveness of preventive interventions.

Competing Interests

The authors declare no competing interests.

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Authors' Contributions

Muhammad Audu Dan-Inu: Conceptualization, study design, data collection, and manuscript drafting. Mahmud Ali Karaga and Ibrahim Ahmad Abubakar: Data analysis and interpretation. Hafsat Musa Gambaki: Literature review and manuscript

revision. Henry Adeiza Onuwe: Critical review and final manuscript approval. All authors read and approved the final manuscript.

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