

# The Prevalence and Perceived Contributing Factors for Work-Related Musculoskeletal Disorders Among Nurses at the University Teaching Hospital in Lusaka, Zambia

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**Abstract:** Introduction: Nurses routinely perform activities which are repetitive, labour intensive and involve direct contact with patients. Such activities have been shown to be risk factors for the development of work-related musculoskeletal disorders. The prevalence of these conditions amongst nurses in Zambia is not well established. The objectives of this study were to determine the prevalence of work-related musculoskeletal disorders within the last year among nurses at the University Teaching Hospital, in Lusaka, Zambia, and to establish the demographic characteristics and perceived job tasks associated with this outcome. Methods: Data were collected using a structured questionnaire in a cross sectional survey. Stata version 12.0 was used to analyze the data. Associations between factors and the presence of work-related musculoskeletal disorders were tested using a multivariate logistic regression model and reported using odds ratios and 95% confidence intervals. Results: The 12-months period prevalence for work-related musculoskeletal disorders was 68.9% in 267 nurses who took part in the study (95% confidence interval 63.1-74.2). The ankles and feet were the most commonly affected body part 54.8% (n=101) followed by the low back 53.3% (n=98). Most respondents (44.7% n=93) had their first experience within five years of graduation. Decreased height, increased weight and years of professional experience, full time position, working in the same position for a long period and adjusting for bed height were among factors identified as associated with work-related musculoskeletal disorders. Conclusion: Work-related musculoskeletal disorders are common among nurses at the University Teaching Hospital. We recommend that education on prevention and coping strategies for work-related musculoskeletal disorders be introduced and encouraged to promote work efficiency and well-being.

**Keywords:** Perceived, Musculoskeletal, Work-related, Injury, Disorders, Physiotherapy

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## 1. Introduction

Approximately 270 million occupational accidents that lead to absence from work, medical treatment, disability and payment of survivor benefits to worker families occur each year [1]. Injuries at a work place comprise a substantial part of injury burden and are an important public health problem that affect not only the person sustaining the injury but also household members that were dependent on the injured adult for support [2]. Although health workers frequently treat

patients with work-related disorders, they also suffer from the same disorders. The injury rate among hospital workers is estimated to be twice that of other service industries [3]. The cause of these disorders is attributed to high levels of patient contact, as well as other variables that include; work place design, cognitive demands, organizational arrangements and psychological factors [2, 4].

Musculoskeletal disorders (MSDs) are inflammatory and degenerative conditions that affects the muscles, tendons, ligaments, joints or peripheral nerves, usually leading to pain or discomfort [3,4,5]. Work-related musculoskeletal disorders

(WRMDs) are musculoskeletal ailments that insidiously result from a work-related activity [5]. Three primary risk factors associated with WRMDs have been identified as repetitious movements, awkward postures and high force levels [5, 6]. These are common in the practice of nursing because nurses routinely perform activities such as lifting and transferring patients from the floor or in and out of the bed. These activities are repetitive, labour intensive and involve direct contact with the patients.

Zambia has been adversely affected by the HIV/AIDS pandemic among adults aged 15-49 years, which has caused an increase in the overall disease burden, compounded by resurgent epidemics, and high poverty levels [7]. Furthermore, non-communicable diseases have become more prevalent due to lifestyle changes, which consequently contribute to a high burden of disease and increased demand on health workers. The aim of the study was to determine the lifetime, 12-months period prevalence and perceived factors for WRMDs among nurses at the University Teaching Hospital (UTH) in Lusaka, Zambia.

## 2. Methods

A cross sectional study was conducted among nurses at the UTH. We used a self-administered questionnaire based on previous published studies to collect data. Ethical clearance and approval was obtained from the Health Research Ethics Committee at Stellenbosch University and ERES Converge International Research Board in Lusaka, Zambia. The study population consisted qualified and practicing nurses in all departments at UTH. Convenient sampling was used as only nurses who were present at the time of data collection and consented to participate in the study were recruited. Data were analysed using Stata version 12.0 (StataCorp, Texas, 1985-2011) for windows. Prevalence and characteristics of WRMDs were described using relative frequencies and percentages with 95% confidence intervals. Summary statistics such as mean, and standard deviation were used to describe continuous variables that were normally distributed. Ordinal variables were compared between independent groups using Mann-Whitney tests. Associations between factors and the presence of WRMDs were tested using a binary logistic regression model. All factors that tested as statistically significant in bivariate analyses were entered into a multivariate logistic model and a backward variable selection method was used to eliminate non-significant factors after adjustment for confounding. Odds ratios and 95% confidence intervals were reported. Statistical significance was set at 5%.

## 3. Results

We distributed 270 questionnaires and received 267, giving a response rate of 98.8%. This included 18.0% (n=48) males. Mean age for both male and female respondents was 36.5 (SD 9.39) years, and mean body weight of 71.0 (SD 12.72) kg. Majority of the participants (95.5%, n=255) were

in full time employment and 57.3% (n=153) had a Diploma in nursing. Only one participant had a Master's degree. The mean years of professional experience were 11.9 (SD 9.26) years (Table 1).

**Table 1.** Demographics and work setting of the sample (n = 267).

Variable	Percentage (Frequency)	Mean (SD)
Age (years)		36.5 (9.4)
Height (cm)		160.8 (9.3)
Weight (kg)		71.0 (12.7)
Gender		
Male	18.0 (48)	
Female	82.0 (219)	
Qualifications		
Certificate	24.7 (66)	
Diploma	57.3 (153)	
Degree	17.6 (47)	
Masters	0.4 (1)	
Professional Experience (years)		11.9 (9.3)
Work status		
Full-time	95.5 (255)	
Part-time	4.1 (11)	
Not stated	0.4 (1)	
Work setting		
Medical wards	23.6 (63)	
Paediatric wards	8.2 (22)	
Theatre	12.7 (34)	
Surgical wards	17.2 (46)	
Maternity wards	21.3 (57)	
OPD clinics	9.4 (25)	
ICU	7.5 (20)	
Hours worked/week		33.8 (10.2)

### 3.1. Work-Related Musculoskeletal Disorders

The 12-months period prevalence for those who experienced work-related pain or discomfort in any part of the body that lasted for more than 3 days was 68.9% (95% CI 63.1, 74.2) and lifetime was 77.9% (95% CI 72.5, 82.5). Details presented in table 2.

**Table 2.** Prevalence of WRMDs (n=267).

WRMDs	Percentage	95% Confidence interval
Life time	77.9	72.5, 82.5
Last 12 months	68.9	63.1, 74.2

### 3.2. Commonly Identified Symptoms and Affected Body Parts in Those Who Experienced Work-Related Musculoskeletal Disorders in the Last 12 Months

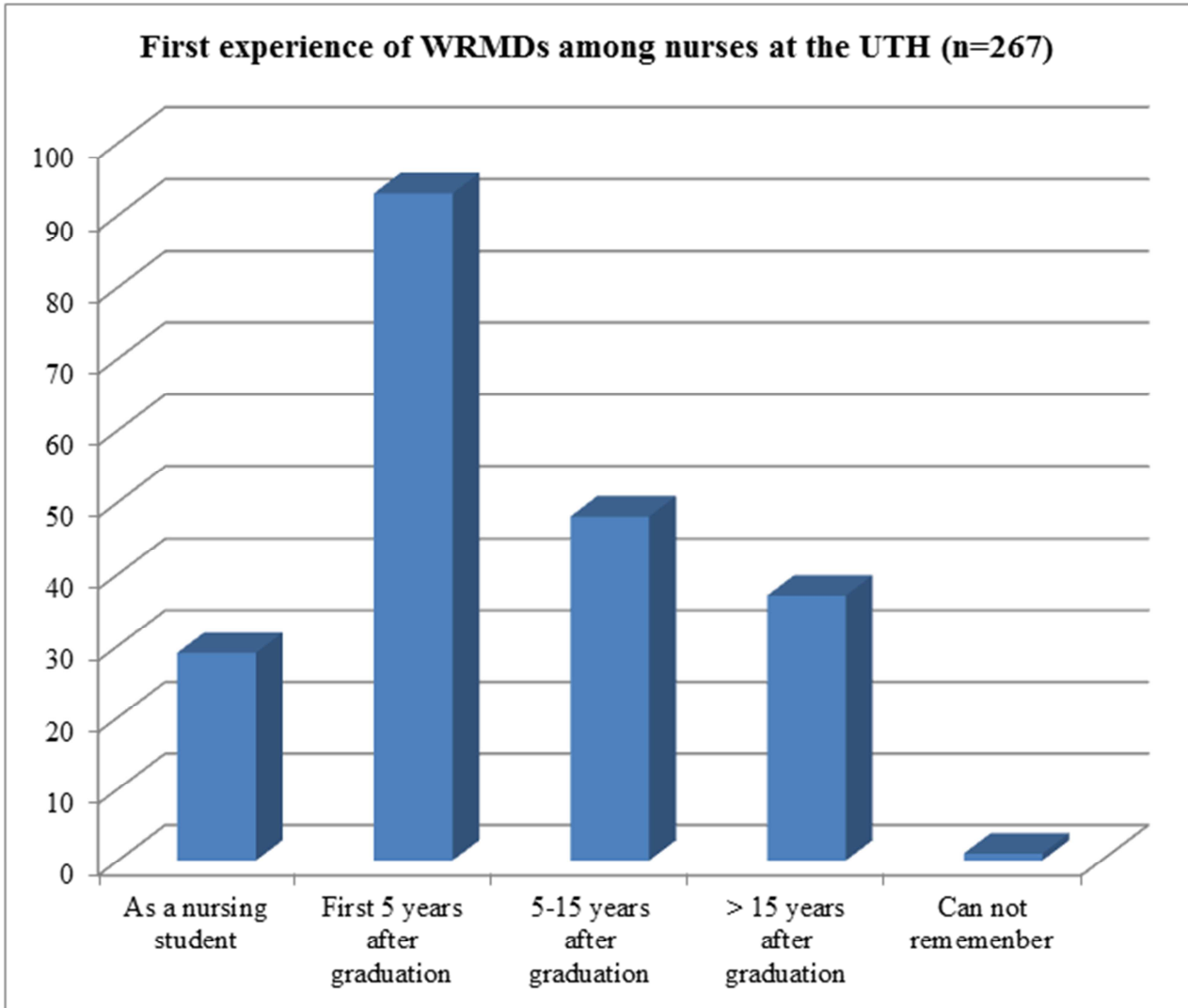
Pain was the most commonly identified symptom by the respondents (77.9%). The ankles and feet were the most commonly affected body parts at 54.9% (n=101) followed by the lower back 53.3% (n=98). Table 3 shows other sites frequently affected.

**Table 3.** Commonly affected body parts in those who had experienced WRMDs in the last 12 months (n=184).

Body part	Percentage (Frequency)
Ankles/feet	54.9 (101)
Low back	53.3 (98)
Shoulders	29.9 (55)
Hips/thighs	24.5 (45)
Upper back	19.0 (35)
Wrist/hands	18.5 (34)
Neck	16.9 (31)
Elbow/forearm	10.3 (19)
Knees	9.2 (17)
Thumbs	1.1 (2)

**3.3. First Experience of Work-Related Musculoskeletal Disorders**

While 13.9% (n=29) had their first experience as nursing students, most of the respondents 44.7% (n=93) experienced their work-related injuries within the first five years of their graduation (Figure 1). For 84.8% (n= 156) respondents, the onset of WRMDs was gradual, it was sudden in 12.50% (n=23) and the result of an accident in the remainder.



**Figure 1.** First experience of work-related musculoskeletal disorders among nurses at the UTH.

**3.4. Perceptions of Job Factors Contributing to the Development of Musculoskeletal Disorders**

Table 4 shows the median scores (on a scale of 0-10) for perceived job factors contributing to the development of WRMDs by those with and without WRMDs. Several job factors were perceived significantly differently between the

groups as contributing to WRMDs. These included performing repetitive tasks, treating many patients, not having enough rest, working in the same position for a long period, bending or twisting the back, assisting patients during movement, working with confused and agitated patients (Table 4).

**Table 4.** Comparison of perceptions of job factors contributing to WRMDs between those with and without WRMDs (n=267).

Job factor	WRMDs Median (IQR)	No WRMDs Median (IQR)	p-value
1. Performing the same task over and over	7 (7)	4 (7)	0.0023*
2. Treating an excessive number of patients in a day	9 (3)	8 (4)	0.0006*
3. Not enough rest breaks or pauses during workdays	8 (4)	7 (4)	0.0225*
4. Working in awkward and cramped positions	7 (6)	7 (5)	0.3501
5. Working in the same position for long periods	8 (3)	7 (5)	≤0.001*
6. Bending or twisting your back in an awkward way	8 (5)	7 (4)	0.0014*
7. Working near or at your physical limits	7 (4)	8 (5)	0.3447
8. Reaching out or working away from your body	6 (5)	5 (6)	0.1225
9. Continuing to work while injured or hurt	7 (3)	7 (6)	0.2931
10. Working with confused or agitated patients	7.5 (5)	6 (5)	0.0021*
11. Lifting or transferring dependent patients	6 (6)	6 (5)	0.0370*
12. Carrying, lifting or moving heavy equipment	6 (5)	7 (6)	0.7802
13. Unanticipated sudden movement or fall by patient	5 (4.5)	5 (5)	0.4753
14. Assisting patients during movement activities	6 (4)	4 (5)	0.0004*
15. Work schedule (Overtime, shifts)	7 (3)	7 (6)	0.1754
16. Inadequate training on injury prevention			0.4680

{Two-sample Wilcoxon rank-sum (Mann-Whitney) test} \*significant at 0.05 level

### 3.5. Binary Logistic Regression Analysis for Odds of Experiencing Wrmds in the Past 12 Months

Table 5 shows the adjusted odds ratios of factors associated with developing WRMDs. As nurses' height increased, their odds of developing WRMDs decreased by 5% for every centimetre (p=0.024). For every kilogram increase in weight, the odds of developing WRMDs increased by 6% (p<0.001). Similarly, every one year increase in professional experience increased the odds by 4%

(p=0.041). Those who worked full time had an almost 17 times higher risk of developing WRMDs than those who worked part time, although the confidence intervals were wide. Working in the same position for long periods was associated with a 31% increase in odds of WRMDs. Those who sometimes adjusted the bed height had a 3.84 times higher odds of having the outcome, and those who always adjusted the bed height had a 7.75 fold increase in odds compared with those who never adjusted the bed height.

**Table 5.** Multivariate logistic regression analysis for odds of experiencing WRMDs in the past 12 months (n=266).

	Adjusted Odds ratio	95% Confidence interval	
		Lower	Upper
Height (cm)	0.95	0.92	0.99
Weight (kg)	1.06	1.03	1.09
Professional experience (years)	1.04	1.00	1.09
Working			
Part time	1		
Full time	16.90	1.63	175.49
Working in the same position for long periods	1.31	1.15	1.49
Adjusted bed height so can stretch and change posture			
Never	1		
Sometimes	3.84	1.91	7.75
Always	7.75	2.50	24.01

### 3.6. Coping Strategies

To reduce the effects of work-related pain or discomforts, adjusting the height of the bed, pausing regularly to stretch and using a different body part to administer a nursing

procedure were commonly adopted coping strategies identified by most respondents with WRMDs (Table 6). Interestingly, 14% had changed their area of speciality because of WRMDs.

**Table 6.** Coping Strategies for work-related musculoskeletal disorders (n=184).

Strategy	Always n (%)	Sometimes n (%)	Never n (%)
I get someone else to help handle a heavy patient	64 (34.8)	111 (60.3)	9 (4.9)
I modify patients position/my position	68 (37.0)	111 (60.3)	5 (2.7)
I use a different part of my body to administer my nursing procedure	50 (27.2)	85 (46.2)	49 (26.6)
I warm up and stretch before performing my nursing duties	8 (4.3)	57 (31.0)	119 (64.7)
I modify my nursing procedure in order to avoid stressing an injury	53 (28.8)	109 (59.2)	22 (12.0)
I pause regularly so I can stretch and change posture	43 (23.4)	115 (62.5)	26 (14.1)
I adjust the bed height so I can stretch and change posture	44 (23.9)	110 (59.8)	30 (16.3)
I select techniques/procedures that will not aggravate/provoke discomfort	46 (25.0)	107 (58.2)	31 (16.9)
I stop a treatment if it causes or aggravate my discomfort	27 (14.7)	76 (41.3)	81 (44.0)

## 4. Discussion

Nursing work is often repetitive and demands physical effort, which may provoke irreversible physical injuries and disabilities [8, 9]. In this study, the 12-months prevalence for those who experienced work-related pain or discomfort in any body part that lasted for more than 3 days was 68.9% the lifetime prevalence was 77.9%. This result is lower than the reported prevalence of 99.1% in Japan, 84% in Sweden, 78% in Ibadan Nigeria and 72.5% in the United States [9, 10, 11, 12]. The difference in the results may be attributed to differences in demographic characteristics, the range of disease conditions, practice settings, number of study participants and the availability of basic equipment. We may have also detected a healthy population since those who were severely affected by the condition may have been absent at the time of data collection.

The most commonly affected body part was the ankle/feet 54.9%. These findings are different from the results of previous studies done in Africa and other regions that implicated the lower back as the most commonly affected body part ranging between 45% and 82.6% [6, 8, 9, 10, 11, 12]. In this study, the low back was the second commonly affected body part at 53.3%, which is higher than the reported prevalence of 44.1% in Nigeria but lower than 82.6% in Japan, and 61.3% in Saudi Arabia [9, 10, 13]. These results correlate to the daily activities that were perceived as contributing to the development of WRMDs, these include; working in the same position for a long period, assisting patients during movement, treating excessive number of patients in one day, working with confused and agitated patients and performing the same task repeatedly.

Most respondents experienced their work-related injuries within the first five years of their graduation and the onset was gradual. This outcome is similar and consistent with the results of most studies done elsewhere among nurses including physiotherapists [9, 14, 15, 16]. Glover *et al* [17] attributes this to newly qualified staff having not yet developed strategies for coping with physical demands of the job and being inexperienced in performing physically demanding tasks.

Smith *et al* [10] in a study among nurses' in rural Japan reported that nurses who were regularly involved in manual handling of patients had an increased risk of MSD of 16.7% compared with those who did not. Furthermore, transferring or moving patients were also predictors of MSD. In this study, working in the same position for long periods was associated with a 31% increase in odds of WRMDs. Those who worked full time had an almost 17 times higher risk of developing WRMDs than those who worked part time, although the confidence intervals were wide. In addition, as nurses' height increased, their odds of developing WRMDs decreased by 5% for every centimetre. For every kilogram increase in weight, the odds of developing WRMDs increased by 6%. Similarly, every one-year increase in professional experience increased the odds by 4%. Age was

not significantly associated with WRMDs in this study, which is contrary to the reports in, Nigeria where the odds of WRMDs decreased with every year increase in age [9, 15, 16]. Those who sometimes adjusted the bed height had a 3.84 times odds of having the outcome and those who always adjusted the bed height had a 7.75 fold increase in odds compared with those who never adjusted the bed height. The association seen between adjustment of the bed height and WRMDs is probably due to reverse causality due to the cross sectional design of this study. Cross sectional studies do not show causation as one cannot be certain if the exposure preceded the outcome or if the exposure is as a result of the outcome. In this instance those with back pain would have made adjustments to their working environment as a result of their disability, thus we cannot conclude that adjusting bed height is a risk factor for WRMDs, it is simply associated with having the outcome.

The fundamental principle of occupational health and safety in prevention of WRMDs is to eliminate hazards [18]. In addition, the prime source of hazard is the repetitiveness of work, applied force, fixed body positions, and the pace of work. Furthermore, the main effort to protect workers from WRMDs should focus on avoiding repetitive patterns of work through job design which may include mechanization, job rotation, job enlargement and enrichment or teamwork. Where elimination of the repetitive patterns of work is not possible or practical, prevention strategies involving workplace layout, equipment design, and work practices should be considered. To reduce the effects of work-related pain or discomfort, adjusting the height of the bed, pausing regularly to stretch and using a different body part to administer a nursing procedure were commonly adopted strategies among participants in this study. The three coping strategies are similar to the findings in previous research [9, 14, 15, 16]. Only a small proportion of respondents changed their area of work or specialty to avoid WRMDs. This may be due to staff shortages at the institution or restrictive areas of practice. To prevent work discomfort and musculoskeletal pain among workers performing strenuous work it is recommended to change work techniques, use-lifting equipment, take breaks and avoiding strenuous job tasks [15, 17]. However, most nurses that participated in this study had not under gone training in ergonomics and may have not been aware of these methods.

According to the American national research council [19] none of the common musculoskeletal disorders is uniquely caused by work exposures. This is because they can be caused by work exposures as well as non-work factors. In addition, physical activities away from the workplace may also cause musculoskeletal syndromes; the interaction of such factors with physical and psychosocial stresses in the workplace is a further consideration. There were no study controls because of the study design; this in itself is a limitation because only secondary data from previous studies was used to compare outcomes. Data collection was only done among personnel who were present at the time of data

collection and information obtained in this study was based on individual experiences and participant's perceived factors therefore, self-reports could have been exaggerated leading to a report bias. This study may have also experienced the "healthy worker" effect, since at the time of data collection those who were severely affected may have been absent from work. This would suggest that we might have under reported the true prevalence of the condition in this population.

## 5. Conclusion

Work-related musculoskeletal disorders are common among nurses at the University Teaching Hospital in Lusaka, Zambia. To promote well-being and work efficiency we recommend that educational programmes on prevention and coping strategies for musculoskeletal disorders be introduced and encouraged among nurses.

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