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Patterns of musculoskeletal disorders among Cameroonian healthcare workers and their associations with physical activity, sedentary behavior, and health-related quality of life

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Research Article

Keywords: Musculoskeletal disorders, physical activity, sedentary behaviors, quality of life, healthcare personnel, Douala-Cameroon

Posted Date: July 14th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10000099/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Healthcare professions entail substantial physical demands, frequently associated with the development of musculoskeletal disorders (MSDs). MSDs negatively impact the physical component summary (PCS) of health-related quality of life (HRQoL). This study aimed to determine the prevalence of MSDs over the preceding 12 months (MSDs-12) and 7 days (MSDs-7d), and to examine their associations with physical activity (PA), sedentary behavior (SB), and HRQoL.

Methods

A cross-sectional study was conducted among healthcare workers, including nurses and medical health technicians, employed in reference hospitals in Douala, Cameroon. MSDs, PA, SB, and HRQoL were assessed using the Nordic questionnaire, the IPAQ, and the SF-36, respectively.

Results

A total of 331 healthcare workers (74.9% female; mean age: 37 ± 9 years) were enrolled. The prevalence of MSDs-12 and MSDs-7d was 81.6% and 46.2%, respectively, with women (MSDs-12: 77.4%; *p = 0.024*) and nurses (MSDs-7d: 64.7%; *p = 0.0005*) being more affected. The most frequently affected anatomical regions were the lower back (MSDs-12: 59.5%; MSDs-7d: 30.5%) and neck (MSDs-12: 37.8%; MSDs-7d: 19.6%). MSDs-12 were associated with male sex (OR:0.37; 95% CI: 0.15–0.94), age above 40 years (OR:2.43; 95% CI: 1.18–5.00), and overweight/obesity (OR:4.23; 95% CI: 1.20–14.90). MSDs-7d were associated with the nursing profession (OR:0.50; 95% CI: 0.31–0.79) and age above 40 years (OR:2.46; 95% CI: 1.51–4.00). SB was associated with neck MSDs-12 (OR:2.77; 95% CI: 1.61–4.74), MSDs-7d (OR:3.12; 95% CI: 1.49–6.52), and shoulder MSDs-7d (OR:2.74; 95% CI: 1.28–5.88). Work seniority exceeding 5 years was associated with neck MSDs-7d (OR:1.96; 95% CI: 1.20–3.81) and lower back MSDs-7d (OR:1.87; 95% CI: 1.02–3.32). Moderate PA was protective against neck MSDs-12 (OR:0.45; 95% CI: 0.21–0.98) and lower back MSDs-12 (OR:0.41; 95% CI: 0.18–0.94). Poor PCS was associated with lower back MSDs-12 (OR:2.27; 95% CI: 1.02–5.07) and knee MSDs-12 (OR:2.28; 95% CI: 1.11–4.67).

Conclusions

This study highlights that MSDs constitute a highly prevalent occupational health concern among healthcare workers in Cameroon, significantly associated with occupational category, sex, age, PA, SB, PCS, and work seniority. These findings underscore the compelling need for targeted preventive interventions to reduce the burden of MSDs and preserve the well-being of this indispensable workforce.

Background

Musculoskeletal disorders (MSDs) constitute one of the most significant occupational health challenges faced by healthcare workers globally, with serious consequences for well-being, workforce productivity,

and healthcare system sustainability[1]. Healthcare workers play a key role in patient care and comfort[2, 3]. They constitute the largest segment of the healthcare workforce worldwide [4]. Healthcare professions entail substantial physical demands, and the associated levels of physical activity (PA) can vary, predisposing some workers to sedentary behaviors [5]. The specific nature of these professions and the long-lasting nature of occupational tasks make healthcare personnel vulnerable to various occupational risk factors. Furthermore, the paramedical profession is constantly characterized by a highly dynamic, static, and considerable workload (e.g., pushing, pulling, transferring, lifting, handling, standing, etc.) [6, 7]. These physical demands predispose healthcare workers to MSDs [8]. Prolonged exposure to risk factors, such as physical, ergonomic, and psychosocial factors, may contribute to the development of MSDs [8].

MSDs are a group of disorders affecting muscles, joints, tendons, ligaments, nerves, bones, and localized sections of the blood vessels, whose origin or aggravation is primarily attributable to professional activity and the conditions in which work is performed. MSDs constitute a key factor in human functioning, by enabling mobility, dexterity, and the ability to work [9]. They are the leading cause of years lived with disability, with low back pain having the greatest impact worldwide [10]. MSDs remain the leading cause of years of productive life lost across numerous activity sectors and professions [9]. Globally, the economic burden of MSDs is substantial, encompassing direct healthcare costs, absenteeism, reduced work capacity, and early retirement, thereby placing considerable strain on both healthcare systems and national economies [11, 12].

MSDs in the workplace represent a growing occupational health problem in modern African societies[13]. Several studies have reported that MSDs are associated with reduced health-related quality of life (HRQoL) in the general population [14]. Recent studies have reported a high prevalence of MSDs in healthcare professionals [13, 15, 16]. The anatomical regions most frequently affected include the lower back, neck, and shoulders, which are directly implicated in the physically demanding tasks performed by healthcare workers on a daily basis [1]. To efficiently mitigate the deleterious impact of MSDs through the development and implementation of preventive strategies, it is crucial to identify at-risk populations, understand their causes, and identify risk factors for the development of MSDs in these populations.

Regular practice of PA represents an important non-pharmacological intervention and preventive strategy against non-communicable diseases, including MSDs[17]. PA improves musculoskeletal health, reduces the risk of pain, strengthens bones and muscles, and preserves joint function. Conversely, insufficient PA and prolonged sedentary behavior (SB) have been increasingly recognized as independent risk factors for the onset and perpetuation of MSDs, through mechanisms including muscle deconditioning, increased mechanical loading on passive spinal structures, and heightened systemic inflammation[18, 19]. Furthermore, the relationship between MSDs and HRQoL is bidirectional: while MSDs negatively impact physical functioning and quality of life, poor HRQoL may itself perpetuate musculoskeletal complaints through reduced motivation for physical engagement and increased pain perception [20, 21]. In the sub-Saharan African context and Cameroon in particular, few studies have

been conducted on MSDs [13, 22] without seeking their associations with SB, HRQoL, and PA among health professionals. Therefore, the present study aimed to determine the prevalence of MSDs and examine their associations with PA, SB and HRQoL among healthcare workers.

Materials and Methods

Study Design and Population

This cross-sectional study was conducted among public paramedical personnel, specifically those involved in healthcare administration (nurses) and biological examinations (medical laboratory technicians) at four referral hospitals in the city of Douala, Littoral region, Cameroon. Individual interviews were carried out between November 2024 and February 2025. Data from the pilot test were not included in the final analysis. Healthcare workers willing to participate in the study with at least one year of professional experience who had signed an informed consent form were included. Participants with a history of trauma or MSDs-related medication use were excluded.

Sampling

A non-probabilistic sampling technique was used to recruit participants. Each participant took approximately 10–15 minutes to complete the questionnaires during the interviews. A pilot test was carried out on 25 participants to assess the acceptability and clarity of the questionnaires. Following this, minor adjustments were incorporated. The sample size was determined using the Lorentz formula [$N = p(1-p)z^2/d^2$, where N is the minimum sample size required; p: prevalence of MSDs; z = 1.96 for 95% confidence; d = 0.05], based on the prevalence of MSDs of 85.4% reported in Cameroon by Meh et al.[22] among paramedical staff. The minimal required sample size was 192 participants. A total of 331 paramedical personnel were finally included in the study.

Ethics

Ethical approval

was obtained from the Institutional Ethics Committee of the University of Douala (reference: 3995CEI-Uo/09/2023/M), and the study was conducted in accordance with the Declaration of Helsinki as revised in 2013. Participants provided informed consent before enrollment. They were informed of the anonymous nature of the analysis of their personal information, and were assured that personal information would not be disclosed. A trained research assistant approached eligible participants and explained the study objectives and procedures. The research assistant was available to address any questions or inquiries. As participants were anonymized through codification for statistical analysis, individual data sharing was not applicable. Patients were not involved in the study design.

Data Collection

Socio-demographic

Socio-demographic information, such as age, sex, profession (nurses or medical health technicians), work seniority, and marital status, were collected during the interviews.

Anthropometric Parameters

Height was measured using a stadiometer graduated to the nearest centimeter. Weight was measured using an electronic scale (Tanita BC-532, Tokyo, Japan). Body mass index (BMI) was determined using the Quetelet formula: BMI ($kg \cdot m^{-2}$) = Weight (kg)/Height² (m^2). Participants were categorized as normal weight ($18.5 \leq BMI < 25$), overweight ($25 \leq BMI < 30$), or obese ($BMI \geq 30$).

Musculoskeletal Disorders

The Standardized Nordic Questionnaire for Musculoskeletal Symptoms was used to assess the prevalence of MSDs [23]. This questionnaire evaluates the occurrence of MSDs across nine body regions (neck, shoulders, elbows, wrists/hands, upper back, lower back, hips/thighs, knees, and ankles/feet) during the preceding 12 months (MSDs-12) or 7 days (MSDs-7d). For each body region, the following parameters were evaluated: (i) the presence or absence of aches, pains, or discomfort during the last 12 months and/or the last seven days; (ii) absenteeism from work during the last 12 months and/or the last seven days due to an MSD in the body region concerned; (iii) a history of trauma in the region concerned. Based on these three items, the prevalence of MSDs-12 and MSDs-7d was determined.

Health-Related Quality of Life

HRQoL was assessed with the Medical Outcomes Study Short-Form SF-36 questionnaire [24]. The questionnaire consists of 36 Likert-type questions grouped into eight scales: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health. These scales are grouped into two summary components: the physical component summary (PCS) and mental component summary (MCS). Scores for each scale and component were transformed into a 0–100 scale, after which z-scores and t-scores were calculated using the internationally standardized method [25]. PCS and MCS scores were considered poor when values were ≤ 50.

Physical Activity and Sedentary Behavior

The International Physical Activity Questionnaire (IPAQ) short form was used to assess participants' level of PA. This questionnaire has demonstrated good validity and reliability in quantifying PA [26]. It assesses PA in three domains (occupational activity, active travel, and recreational activity). The first six items require participants to report the frequency and duration of low-, moderate-, and vigorous-intensity

PA during the previous week. The seventh item quantifies total sedentary time during weekdays. PA was expressed as Metabolic Equivalent of Task (MET)-min/week, calculated by multiplying the MET value assigned to each activity (vigorous: 8 METs; moderate: 4 METs; walking: 3.3 METs) by the number of minutes and days it was performed during the previous 7 days [27]. According to IPAQ guidelines, total PA was divided into three categories: high, moderate, and low. Sedentary behaviors were considered for energy expenditure ≤ 1.5 METs.

Data analysis

Data were entered into Microsoft Excel 2016 and analyzed using the Statistical Package for Social Sciences version 20 (IBM SPSS, Chicago, USA). The Kolmogorov–Smirnov test was performed to assess the normality of continuous data. Qualitative variables were presented as percentages (%) and quantitative variables as mean ± standard deviation (SD). Descriptive statistics included means and SDs for quantitative variables, as well as absolute and relative frequencies of categorical variables. The 95% confidence intervals (95% CI) for proportions were determined [28]. The Pearson chi-square test was used to compare categorical variables, and the Student's t-test was used to compare quantitative variables by sex. Associated factors of MSDs were quantified by computing odds ratios with 95% CI. Statistical significance was set at $p < 0.05$.

Results

Participants' Sociodemographic Characteristics

A total of 331 participants with a mean age of 37 ± 9 years were recruited; women were significantly older (*p = 0.0008*), and constituted the majority (74.9%). The majority of women were over 40 years of age (67.3%; *p = 0.024*). More than half of the participants were nurses (53.4%). Regarding marital status, almost half (47.7%) were single, a proportion significantly higher among men (50.6%; *p = 0.021*). More than half of the participants were overweight or obese (36.9% and 35.3%, respectively), with men being more frequently overweight (42.2%; *p < 0.0001*) and women more frequently obese (44.3%). Nea of half participants had poor MCS (51.7%), and PCS (48.3%). Regarding PA, half of the health workers had a low level of physical activity (48.0%) and 41.1% had a moderate level. More than half (66.5%) exhibited sedentary behaviors (Table 1).

Table 1
Sociodemographic, anthropometric profile according to gender

Parameters		Gender			
	Categories	**Overall, *n* (%)**	**Males *n* (%)**	**Females *n* (%)**	***p*-value**
Age (years)	≤ 40	97 (29.3)	67 (80.7)	81 (32.7)	0.024
	> 40	234 (70.7)	16 (19.3)	167 (67.3)	
Seniority (years)	≤ 5	216 (65.0)	56 (67.5)	160 (64.5)	0.624
	> 5	115 (35.0)	27 (32.5)	88 (35.5)	
Profession	Nurses	180 (53.4)	35 (41.2)	145 (58.5)	0.009
	MHT	151 (45.6)	48 (57.8)	103 (41.5)	
Marital status	Single	150 (47.7)	42 (50.6)	108 (43.6)	0.021
	Married	122 (36.9)	21 (25.3)	101 (40.7)	
	Divorced	59 (17.8)	20 (24.1)	39 (15.7)	
Ponderal status	Normal	92 (27.8)	41 (49.4)	51 (20.6)	< 0.0001
	Overweight	122 (36.9)	35 (42.2)	87 (35.1)	
	Obese	117 (35.3)	7 (8.4)	110 (44.3)	
PCS	< 50	171 (51.7)	39 (47.0)	121 (48.8)	0.774
	≥ 50	160 (48.3)	44 (53.0)	127 (51.2)	
MCS	< 50	170 (51.7)	41 (49.2)	129 (52.0)	0.672
	≥ 50	161 (48.3)	42 (50.8)	119 (48.0)	
Level of PA	Low	159 (48.0)	38 (45.8)	121 (48.8)	
	Moderate	136 (41.1)	36 (43.4)	100 (40.3)	0.871
	High	36 (10.9)	9 (10.8)	27 (10.9)	
Sedentary behaviors	Yes	220 (66.5)	56 (25.5)	164 (74.5)	0.823
	No	111 (33.5)	27 (24.3)	84 (75.7)	
(Mean ± SD)	Age (years)	37 ± 9	34 ± 7	37 ± 9	0.008

MHT: Medical-health technicians, WC: Waist circumference, WhtR: waist to heigh ratio, WhR: Waist to hip ratio, PA: Physical activity, HRQoL: Heath related to quality of life; PCS: Physical component summary, MCS: Mental component summary.

Parameters		Gender			
	Categories	**Overall,** ***n*** **(%)**	**Males** ***n*** **(%)**	**Females** ***n*** **(%)**	***p*****-value**
	Seniority	6 ± 6	5 ± 6	6 ± 5.5	0.122
Anthropometric	Weight (Kg)	79 ± 15.3	77.2 ± 12.8	79.7 ± 16.2	0.221
	Height (m)	1.66 ± 0.08	1.74 ± 0.73	1.63 ± 0.63	< 0.0001
	BMI ($Kg.m^{-2}$)	28.7 ± 5.9	25.4 ± 4.6	30 ± 5.9	< 0.0001
HRQoL	PCS	51.2 ± 8.7	65.9 ± 22.1	66.3 ± 19.7	0.872
	MCS	50 ± 10	56.3 ± 16.8	58 ± 14.7	0.381

MHT: Medical-health technicians, WC: Waist circumference, WhtR: waist to heigh ratio, WhR: Waist to hip ratio, PA: Physical activity, HRQoL: Heath related to quality of life; PCS: Physical component summary, MCS: Mental component summary.

Prevalence of MSDs

The overall prevalence of MSDs-12 and MSDs-7d was 81.6% (95% CI: 77.1–85.4) and 46.2% (95% CI: 40.8–51.8), respectively. The prevalence of MSDs-12 was significantly higher in women than in men (77.4% vs. 22.6%; *p = 0.024*). Among participants with poor PCS, the prevalence rates of MSDs-12 and MSDs-7d were 81.3% (95% CI: 74.5–86.5) and 45.0% (95% CI: 37.5–52.7), respectively. Among participants with poor MCS, MSDs prevalence was 81.2% (95% CI: 74.6–86.3) and 47.1% (95% CI: 39.7–54.5) over the last 12 months and 7 days, respectively; women were more affected over the last 12 months (78.6%; p = 0.04). More than half of the participants with MSDs-12 were affected in fewer than three body regions (Table 2). The most frequently affected body regions during the last 12 months and 7 days were the lower back (MSD-12: 59.5%, 95% CI: 54.2–64.7; MSDs-7d: 30.5%, 95% CI: 25.5–35.4, respectively) followed by the neck (MSD-12: 37.8%, 95% CI: 32.4–42.8 MSDs-7d: 19.6%, 95% CI: 15.7–24.3, respectively). Among participants with poor MCS, the same body regions were predominantly affected for both MSDs-12 and MSDs-7d (Table 3).

Table 2
Prevalence of MSDs

Parameters	MSDs-12			MSDs-7d		
	%	95%CI	*p*-value	%	95%CI	*p*-value
Prevalence						
Overall	81.6	77.1–85.4		46.2	40.8–51.8	NA
Profession						
Nurse	54.8	48.9–60.6	0.715	64.7	56.9–71.8	0.0005
MHT	45.2	39.4–51.2		35.3	28.2–43.1	
Gender						
Females	77.4	72.1–82.0	0.024	79.1	71.9–84.8	0.137
Males	22.6	18.0-27.9		20.9	15.2–28.0	
Body regions affected						
< 3	67.3	59.5–74.3	NA	100	-	NA
≥ 3	32.7	25.8–40.5		0	-	
HRQoL						
PCS	81.3	74.5–86.5	NA	45	37.5–52.7	NA
MCS	81.2	74.6–86.3		47.1	39.7–54.5	

NA: Not applicable, HRQOL: Health-related to quality of life, PCS: Physical component summary, MCS: Mental component summary.

Table 3
Prevalence of MSDs according to body regions

Body regions	Overall		Poor PCS		Poor MCS	
	n (%)	95%CI	*n* (%)	95%CI	*n* (%)	95%CI
MSDs-12						
Neck	**124(37.5)**	32.4–42.8	**28(39.4)**	28.9–51.1	**32(36.4)**	27.1–46.8
Shoulders	51(15.4)	11.9–16.7	11(15.5)	8.9–25.6	15(17.0)	10.6–26.2
Elbows	19(5.7)	3.7–8.8	5(7.0)	3.0-15.4	6(6.8)	3.2–14.1
Wrists/hands	34(10.3)	7.4–14	8(11**.3**)	5.8–20.7	9(10.2)	5.5–18.3
Upper back	114(34.4)	29.5–39.7	21(29.6.)	20.2–41.0	27(30.7)	22.0–41.0
Lower back	**197(59.5)**	54.2–64.7	**38(53.5)**	42.0-64.6	**46(52.3)**	42.0-62.4
Hips/thigh	22(6.7)	4.4–9.9	6(8.4)	3.9–17.2	10(11.4)	6.3–19.7
Knees	97(29.3)	24.7–34.4	20(28.2)	18.9–32.2	23(26.1)	18.1–36.2
Ankles/feet	42(12.7)	9.5–16.7	6(8.4)	8.8–19.4	7(8.0)	3.9–15.5
MSDs-7d						
Neck	**65(19.6)**	15.7–24.3	**16(22.5)**	14.3–33.5	**21(23.9)**	16.2–33.7.
Shoulders	11(3.3)	1.9–5.8	1(1.4)	0.2–7.6	4(2.3)	1.8–11.1
Elbows	5(1.5)	0.7–3.5	0 (0.0)		1(1.1)	0.2–6.2
Wrists/hands	2(0.6)	0.2–2.2	0(0.0)		1(1.1)	0.2–6.2
Upper back	23(6.9)	4.7–10.2	4(5.6)	2.2–13.6	6(6.8)	3.2–14.1
Lower back	**100(30.5**)	25.5–35.4	**18(25.4)**	16.7–36.5	**25(29.1)**	20.0-38.6

MSDs-12: Prevalence of musculoskeletal disorders during the last 12 months; MSDs-7d: Prevalence of musculoskeletal disorders during the7 last days, PCS: physical component summary, MCS: Mental component summary; CI: Confidence, intervals.

Body regions	Overall		Poor PCS		Poor MCS	
	n (%)	95%CI	*n* (%)	95%CI	*n* (%)	95%CI
MSDs-12						
Hips/thigh	9(2.7)	1.4–5.1	3(4.2)	1.4–11.7	3(3.4)	1.2–9.6
Knees	45(13.6)	10.3–17.7	9(12.7)	6.8–22.4	13(14.8)	8.8–23.6
Ankles/feet	9(2.7)	1.4–5.1	1(1.4)	0.2–7.6	2(2.3)	0.6–7.9

MSDs-12: Prevalence of musculoskeletal disorders during the last 12 months; MSDs-7d: Prevalence of musculoskeletal disorders during the7 last days, PCS: physical component summary, MCS: Mental component summary; CI: Confidence, intervals.

Associated Factors of MSDs

The multivariable analysis of factors associated with MSDs is shown in Tables 4 & 5. Male sex was associated with a significantly lower risk of MSDs-12 (OR: 0.37; 95% CI: 0.15–0.94; *p = 0.03*) compared to females. Participants aged over 40 years had more than twice the risk of MSDs-12 (OR: 2.43; 95% CI: 1.18–5.00; *p = 0.012*) and MSDs-7d (OR: 2.46; 95% CI: 1.51–4.00; *p = 0.0003*). Overweight and obese participants had a higher risk of MSDs-12 (OR: 4.23; 95% CI: 1.20–14.90; *p = 0.021*) compared to those with normal BMI.

Table 4
Associated factors of MSDs

Parameters	Categories	MSDs-12		MSDs-7d	
		OR (95%CI)	*p*-value	OR (95%CI)	*p*-value
Gender	Female	1		1	
	Males	0.37 (0.15–0.94)	0.030	0.74 (0.44–1.24)	0.240
Profession	Nurses	1		1	
	MHT	1.00 (055 – 1.80)	0.738	0.50 (0.31–0.79)	0.001
Seniority (years)	≤ 5	1		1	
	> 5	0.91 (0.49–1.70)	0.781	1.24 (0.75–2.10)	0.518
Age (years)	≤ 40	1		1	
	> 40	2.43 (1.18–5.00)	0.012	2.46 (1.51-4.00)	0.0003
Ponderal status	Normal	1		1	
	Overweight & obese	4.23 (1.20–14.90)	0.021	1.14 (0.62–2.50)	0.774
PCS	< 50	1		1	
	≥ 50	0.40 (0.08–1.91)	0.253	0.60 (0.18–1.92)	0.387
MCS	< 50	1		1	
	≥ 50	0.94 (0.41–2.16)	0.893	1.41 (0.74–2.68)	0.294
Sedentary behaviors	Yes	1		1	
	No	0.67 (0.35–1.28)	0.231	1.49 (0.91–2.46)	0.127
Level of PA	High	1		1	
	Moderate	1.00 (0.36–2.81)	0.987	1.04 (0.48–2.27)	0.726

OR: odd ratio, CI: Confidence intervals, MSDs-12: Prevalence of musculoskeletal disorders during the last 12 months, MSDs-7d: Prevalence of Prevalence of musculoskeletal disorders during the7 last days, PCS: Physical component summary, MCS: Mental component summary, PA: Physical activity, MHT: Medical-health technicians.

Parameters	Categories	MSDs-12		MSDs-7d	
		OR (95%CI)	*p*-value	OR (95%CI)	*p*-value
	Low	0.58 (0.21–1.63)	0.302	1.06 (0.48–2.32)	0.741

OR: odd ratio, CI: Confidence intervals, MSDs-12: Prevalence of musculoskeletal disorders during the last 12 months, MSDs-7d: Prevalence of Prevalence of musculoskeletal disorders during the7 last days, PCS: Physical component summary, MCS: Mental component summary, PA: Physical activity, MHT: Medical-health technicians.

Healthcare workers with work seniority > 5 years were at greater risk of MSDs-7d in the neck (OR: 1.96; 95% CI: 1.20–3.81; *p = 0.044*) and at lower risk of MSDs-7d in the shoulders (OR: 0.07; 95% CI: 0.01–0.49; *p = 0.0007*). Furthermore, participants aged ≤ 40 years were at lower risk of MSDs-7d in the neck (OR: 0.43; 95% CI: 0.21–0.91; *p = 0.024*) and shoulders (OR: 0.36; 95% CI: 0.15–0.89; *p = 0.021*). The odds of neck MSDs-12 (OR: 2.77; 95% CI: 1.61–4.74; *p = 0.0002*) and MSDs-7d (OR: 3.12; 95% CI: 1.49–6.52; *p = 0.002*) were approximately three-fold higher in sedentary participants. Additionally, participants with SB were at greater risk of shoulder MSDs-7d (OR: 2.74; 95% CI: 1.28–5.88; *p = 0.0009*). Male sex was associated with a 57% reduction in lower back MSDs-12 (OR: 0.43; 95% CI: 0.21–0.91; *p = 0.022*) compared to females. Participants with work seniority exceeding 5 years had a significant risk of lower back MSDs-12 (OR: 1.66; 95% CI: 1.01–2.74; *p = 0.041*) and MSDs-7d (OR: 1.87; 95% CI: 1.02–3.32; *p = 0.034*), and a lower risk of knee MSDs-12 (OR: 0.55; 95% CI: 0.33–0.98; *p = 0.024*). Participants aged over 40 years were at significantly greater risk of lower back MSDs-12 (OR: 1.73; 95% CI: 1.01–2.74; *p = 0.043*), knee MSDs-12 (OR: 2.40; 95% CI: 1.39–4.15; p = 0.003), and lower back MSDs-7d (OR: 3.31; 95% CI: 1.87–5.85; *p < 0.0001*).

Healthcare workers with a moderate level of PA had a significantly lower risk of neck MSDs-12 (aOR: 0.45; 95% CI: 0.21–0.98; *p = 0.04*) and lower back MSDs-12 (OR: 0.41; 95% CI: 0.18–0.94; *p = 0.037*) compared to those with a low PA level. Healthcare workers with poor PCS were at greater risk of lower back MSDs-12 (OR: 2.27; 95% CI: 1.02–5.07; *p = 0.041*) and knee MSDs-12 (OR: 2.28; 95% CI: 1.11–4.67; *p = 0.022*).

Discussion

The present study aimed to determine the prevalence of MSDs and investigate their associations with PA, HRQoL, and SB among healthcare personnel, specifically healthcare workers in Douala, Cameroon. MSDs were highly prevalent in our sample, with a prevalence of 86.6% (95% CI: 77.0–90.0) during the last 12 months (Table 1). In a systematic review, Friedenberg et al. [29] found an annual prevalence of MSDs among emergency medical technicians and paramedics ranging from 30% to 88%. Similarly, a study examining MSDs among healthcare workers from all specialties, including nurses and laboratory technicians, in a provincial hospital in Ouarzazate by Ali et al. [30] found a high prevalence of MSDs of 89.2%. In contrast, a study conducted in Nigeria by Akodu & Ashalejo [31] reported lower prevalences

than ours. During the last 7 days, the MSDs rate was 46.2% (95% CI: 40.8–51.8) (Table 1). This prevalence is lower than that reported by Yasobant and Rajkumar [32], who observed a prevalence of 90.1% among healthcare workers during a week, but higher than the 33.8% observed by Chandralekha et al. [33] in India.

Regarding sex, MSDs were more prevalent in women (Table 2). Women are significantly more prone to developing MSDs. From an anatomical perspective, the female body has been identified as contributing to the development of pain in certain body regions such as the back, resulting in a higher prevalence than in men [34]. Additionally, MSDs in women may be related to their lower muscle mass and bone density, which may lead to greater bodily destabilization and therefore insufficient compensation for high mechanical loads [35]. Regarding occupational category, musculoskeletal complaints were highly prevalent among nurses (Table 2). This result corroborates those of other researchers who found that MSDs were more prevalent among nurses within healthcare professions [1, 13, 36]. This finding may be related to the demanding characteristics of the nurses' work environment associated with body hypersolicitation. During a typical shift, nurses carry out physically demanding tasks, such as providing care to highly dependent patients with reduced mobility, performing surgical unit care or in the case of medical laboratory technicians, reading slides under a microscope, which may involve fewer physical demands.

During the last 12 months and the preceding 7 days, the lower back and neck were the most frequently affected regions (Table 3). These findings are consistent with previous studies reporting that these two body regions were the most commonly affected among healthcare workers [1, 32, 37]. This may be attributed to the elevated prevalence of low back pain and neck pain among paramedical personnel. Elevated prevalence of low back pain in healthcare workers was associated with high physical workload, poor ergonomics, and insufficient social support at work. Nurses and medical health technicians often perform physically demanding tasks including lifting, biological analysis, and delivering healthcare, which can strain the back and neck muscles. Moreover, they may work in awkward positions or confined spaces, which can lead to poor posture and increased stress on the spine. Furthermore, repetitive movements, such as bending, twisting, lifting, and reaching, can also contribute to MSDs over time [38].

Age, sex, work seniority, and weight status were significantly associated with MSD risk specifically, an age above 40 years constituted an important risk factor for MSDs (Tables 4 & 5). Previous studies have demonstrated that age increases the risk of MSDs, particularly after the age of 40 years [8, 39]. As individuals age, the body undergoes a gradual decline in muscle mass and strength, which can lead to decreased joint stability and increased susceptibility to musculoskeletal injuries and pain[40]. Furthermore, women were at significantly greater risk of MSDs than men. From a physiological standpoint, women have different hormonal profiles that reduce total muscle cross-sectional area compared to men, which can affect connective tissues and increase the risk of MSDs [41]. Evidence also suggests that women may be more sensitive to pain and more likely to report MSDs compared to men, which can contribute to the observed higher prevalence [39, 42].

MSDs among healthcare workers were associated with work seniority. These findings support those of prior studies suggesting that years of professional experience are linked to MSDs[43, 44]. Furthermore, participants with abnormal weight status were at greater risk of MSDs. Several studies have indicated that obesity and overweight may cause pain by increasing the mechanical stress on weight-bearing joints [45, 46]. From a biomechanical perspective, excess body weight leads to mechanical overload of joints, tendons, and muscles, which can cause tissue damage and inflammation. Additionally, reduced muscular strength associated with abnormal weight status decreases the capacity of the muscles to support body weight and increases the risk of tendinopathies and injuries [47].

No significant association was found between PA level and overall MSDs during the last 12 months or the preceding 7 days. This finding may be related to the overall PA levels observed in the study sample. In the present study, nearly half of participants (47.7%) had a low level of PA and more than half (65.5%) were sedentary (Table 4). These results are consistent with those of several authors who found that occupational PA in healthcare settings mainly consists of light-intensity activity, interspersed with moderate-intensity tasks and substantial sedentary behavior [5, 47]. Variability in PA levels may depend on the work characteristics associated with the sector of activity and patient needs [48]. For example, among nurses, in whom the majority of PA research has been conducted, those in surgical units (who predominantly maintain a standing position) have lower PA intensity than those in medical units who typically walk and take care of patients.

Regarding body regions, the results indicate that a moderate level of PA was associated with a significantly lower risk of low back pain (Table 5). These findings are consistent with those of Oakman et al. [48] who observed that workplace PA interventions were effective in preventing and managing MSDs among healthcare workers, including paramedical workers. Other studies have shown that PA reduces and prevents the occurrence of low back pain in numerous occupational sectors, including healthcare [49, 50]. A study conducted by Niederstrasser & Attridge [51]found that moderate and high PA were associated with a lower likelihood of experiencing musculoskeletal pains compared to physical inactivity. Similarly, Gordon & Bloxham [52] examined the impact of PA and physical exercise on the management of low back pain and showed that both PA and physical exercise were beneficial for low back pain rehabilitation. PA represents an effective, cost-effective, and safe therapeutic option for managing MSDs, without the adverse effects of medications or invasive treatments. For chronic MSDs, the greatest benefits are typically seen with light-to-moderate intensity exercise programs performed 2–3 times per week for at least 4 weeks [53].

Furthermore, participants with sedentary behaviors were at significantly greater risk of MSDs (Table 5). It is well established that physical inactivity and sedentary behavior can aggravate MSDs [54]. Sedentary behavior can alter muscle activity and strength, leading to muscle imbalances, decreased joint mobility, and increased strain on the musculoskeletal system. Moreover, sedentary behavior may increase pain sensitivity through physiological changes such as reduced blood flow and increased inflammation [55]. Prolonged sedentary behavior may also reduce the likelihood of taking breaks, stretching, or engaging in other preventive behaviors, thereby further increasing the risk of musculoskeletal disorders. Sedentary

behavior is often accompanied by reduced PA, which can weaken muscles and reduce joint stability, predisposing individuals to musculoskeletal disorders; additionally, prolonged static sitting posture increases compressive forces on the intervertebral discs and contributes to low back pain [56],

In this study, Poor PCS was associated with specific regional MSDs, notably lower back and knee MSDs-12 (Table 5). MSDs can significantly impair the HRQoL of healthcare workers, and are strongly associated with reduced physical component scores. Several researchers have found that the presence of one or more MSDs is associated with lower scores across all dimensions of HRQoL [38, 56]. The PCS of HRQoL is negatively impacted by MSDs among healthcare personnel. The PCS reflects an individual's physical functioning, role limitations due to physical problems, bodily pain, and general health perceptions [57]. Such impairment in the physical component of HRQoL may have significant consequences, as it may limit the capacity of healthcare workers to perform their professional duties optimally[40].

Strengths and limitations

This is the first study in Cameroon to highlight baseline data about the prevalence of musculoskeletal complaints, PA and HRQoL among healthcare workers in reference hospitals in Douala. The study sample size is representative of the paramedics working in Douala. There are several limitations to consider in this study. The study tools were self- reported tools, which made them more prone to subjective bias. Therefore, future studies are indicated to investigate MSDs and complaints with more objective methodologies as limitations. The IPAQ short form is self-reported and may overestimate physical activity levels; objective measures (e.g., accelerometry) would be preferable.

The absence of objective ergonomic data on workstations limits the causal interpretation of the associations found. This study did not take into account poor quality of sleep in healthcare workers who used to have night shift which is an important associated factor of MSDs. Also, occupational sector of paramedics was not considered in the present work. The study employed a cross- sectional design, which limits the ability to establish causality or determine the temporal relationships between variables. A longitudinal study will be more appropriate for determining the causality effects.

Conclusion

The present study reveals that MSDs represent a significant occupational health concern with high prevalence among healthcare staff, particularly nurses. Low back pain and neck pain were more predominant. The study also outlined a protective effect of PA in preventing occurrence of MSDs. Musculoskeletal complaints were associated with gender, age, ponderal status, PA, and PCS. This outcome has many implications for healthcare workers and provides a framework for establishing preventive interventions to reduce MSDs among them in order to preserve the well-being of this important healthcare workers. Targeted interventions should prioritize moderate-intensity PA programs

and reduction of prolonged sedentary time through regular movement breaks, particularly for nurses and workers aged over 40 years.

Abbreviations

MSDs	Musculoskeletal disorders
MSDs-12	Musculoskeletal disorders during the last 12 months
MSDs-7d	Musculoskeletal disorders during the last 7 days
PA	Physical activity
SB	Sedentary behavior
HRQoL	health-related quality of life
PCS	Physical component summary

Declarations

Acknowledgements The authors gratefully acknowledge all of the public hospital managers for administrative authorization and healthcare workers who participated in this study.

Contributors JMN, WMB contributed to conceptualization, Methodology, Investigation, Formal

Analysis, Data Curation, Writing – Original Draft, Visualization, AULT, EGNN and ASMR supervised data collection. HAMM, A, BKM and LPKF contributed to Data Curation and Investigation. WRG and CNAA contributed to Conceptualization, Methodology, Supervision and Writing – Review & Editing. SHM, PBAN, LJOM, MB, and BB contributed to Supervision, and Writing – Review & Editing. All authors have made a considerable contribution to the reviewing the manuscript. All authors have approved the final manuscript.

Funding: No

Competing interests: None declared.

Ethical approval to conduct the study was obtained from the Institutional Ethics Committee of the University of Douala (reference: 3995CEI-Uo/09/2023/M) participants gave informed consent to participate in the study before taking part.

Data availability statement Data are available on reasonable request.

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Table 5

Table 5 is available in the Supplementary Files section.

Supplementary Files

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- Table5.docx