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Prevalence of Musculoskeletal Disorders, Sedentary Behaviour, and Physical Activity Patterns Among Taxi Drivers in Nairobi, Kenya

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Abstract

Musculoskeletal disorders (MSDs) are a major occupational health concern among professional drivers due to prolonged sitting, static postures, limited physical activity, and poor ergonomics. This study investigated the prevalence of musculoskeletal disorders, sedentary behaviour, and physical activity patterns among taxi drivers in Nairobi, Kenya. A cross-sectional analytical survey design was employed, targeting 200 taxi drivers randomly selected from the top 10 registered taxi companies in Nairobi. Data were collected using self-administered questionnaires, including the Global Physical Activity Questionnaire (GPAQ), Cornell Musculoskeletal Disorder Questionnaire (CMDQ), Occupation Sitting and Physical Activity Questionnaire (OSPAQ), and Sedentary Behaviour Questionnaire (SBQ). Descriptive and inferential statistics, including Chi-square and logistic regression analyses, were used to examine associations between prolonged sitting, sedentary behaviour, physical inactivity, and the prevalence of MSDs. The findings revealed that 42.2% of taxi drivers reported experiencing musculoskeletal pain, with the lower back (60%) and hips (52.9%) being the most commonly affected regions. Drivers with 5–6 years of experience reported the highest incidence of MSDs. Prolonged sitting, inadequate physical activity, and poor ergonomics were significantly associated with musculoskeletal discomfort ($p < 0.05$). Male drivers dominated the workforce (87.8%), with the majority aged 31–35 years. The study highlights the occupational vulnerability of taxi drivers to MSDs, emphasizing the need for ergonomic interventions, physical activity promotion, and targeted occupational health policies. These findings contribute to the growing body of evidence on work-related musculoskeletal disorders in sedentary occupations and provide a foundation for future interventions aimed at reducing MSD prevalence among taxi drivers in Nairobi and similar urban settings.

Keywords: *Musculoskeletal Disorders (MSDs), Taxi Drivers, Prolonged Sitting, Sedentary Behaviour, and Occupational Health*

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1. Introduction

Musculoskeletal disorders (MSDs) impose a large and growing global health burden. Low back pain (LBP) is a principal manifestation of MSDs; it has affected well over 600 million people worldwide in recent Global Burden of Disease estimates, and years lived with disability

attributable to LBP and other MSDs have increased substantially over the past three decades. These trends underline MSDs as leading contributors to functional limitation, lost productivity, and health system costs globally (Zhang et al., 2024; Wu et al., 2025).

Systematic reviews focused on occupational drivers confirm a high prevalence of MSDs in this work group: a recent meta-analysis found consistently elevated rates of musculoskeletal symptoms among taxi and professional drivers compared with many other occupations (Rezaei et al., 2024; Pickard et al., 2022). Driving work exposes individuals to established biomechanical and behavioural risk factors for MSDs: prolonged, uninterrupted sitting, constrained postures, whole-body vibration, repetitive trunk/neck movements, and limited opportunity for restorative physical activity (Tremblay et al., 2017; Pickard et al., 2022). Sedentary behaviour, like any waking activity ≤1.5 METs performed while sitting or reclining, is particularly salient to driving occupations because long sedentary bouts accumulate during shifts and are linked to musculoskeletal discomfort and cardiometabolic risk in other occupational groups (SBRN/(Tremblay et al., 2017; Thivel et al., 2018)—regional empirical studies in Africa and beyond document high MSD burdens among taxi drivers.

In Yaoundé, Cameroon, 86.8% of taxi drivers reported one or more MSDs in the previous 12 months, with the lower back (72.8%) and neck commonly affected (Tchounga et al., 2022). Urban taxi drivers in Ghana reported elevated MSD prevalence associated with long driving hours, job stress, and poor ergonomics (Abledu, Offei & Abledu, 2014). Studies in Ethiopia and Brazil similarly report substantial proportions 50–90%) of drivers experiencing work-related musculoskeletal pain, often linked to driving duration, age, and limited physical activity (Wanamo et al., 2017; da Silva et al., 2019; Aredo, 2024).

In Kenya, the occupational health profile of taxi and app-based drivers remains underdocumented despite the rapid growth of urban passenger transport. The contrast between local and regional figures may reflect methodological differences, sampling frames, or true variation by local working conditions, vehicle ergonomics, and driver behaviours. Nonetheless, the combination of prolonged sitting, irregular shift patterns, poor seat ergonomics, and limited workplace health interventions suggests Nairobi drivers remain a population at risk (Pickard et al., 2022; Tchounga et al., 2022).

Despite convergent evidence that prolonged sitting and low physical activity are important correlates of MSDs in driving populations, causal pathways are complex and likely involve ergonomic, psychosocial (job dissatisfaction, stress), and individual (age, BMI, years driving) factors (Rezaei et al., 2024; Abledu et al., 2014). There is therefore an urgent need for context-specific empirical data from Nairobi that simultaneously measure MSD prevalence, sedentary behaviour (duration and bout patterns), and physical activity levels to inform tailored prevention strategies, ergonomic interventions, and occupational health policy for taxi drivers in Kenya.

The purpose of the study was to examine the prevalence of musculoskeletal disorders (MSDs) and to assess sedentary behaviour and physical activity patterns among taxi drivers in Nairobi, Kenya. The study sought to generate evidence to inform occupational health interventions that improve taxi drivers' well-being.

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2. Literature Review

2.1 Theoretical Review

This study is anchored on Kumar's (2001) Cumulative Load Theory, which provides a scientific explanation for how prolonged sitting, repetitive movements, and sustained physical strain contribute to the development of musculoskeletal disorders (MSDs). According to the Cumulative Load Theory, biological tissues like muscles, tendons, ligaments, and spinal structures have a limited capacity to withstand continuous mechanical stress. When these tissues are repeatedly exposed to forces such as vibration, constrained posture, or prolonged sitting without sufficient recovery time, leading to painful musculoskeletal conditions (Tuovinen & Sweller, 1999; Kumar, 1990).

For taxi drivers in Nairobi, prolonged driving hours, repetitive manoeuvres, poorly adjusted seats, fixed postures, and exposure to whole-body vibration represent continuous loading cycles on the musculoskeletal system. These ergonomic and occupational exposures contribute to chronic fatigue, spinal compression, lower back pain, neck stiffness, and general MSD risk (Hakim & Mohsen, 2017). Poor vehicle ergonomics and insufficient break opportunities exacerbate the cumulative load on drivers. Therefore, the Cumulative Load Theory provides a relevant lens for understanding how taxi drivers' daily work activities contribute to the prevalence of MSDs, particularly in environments where prolonged sitting and sedentary behaviour are routine. By grounding the study in this theory, the research demonstrates how mechanical, ergonomic, and behavioural stressors interact over time to influence MSD prevalence, thereby aligning the theoretical foundation closely with the study's focus on musculoskeletal disorders, sedentary behaviour, and physical activity patterns among Nairobi taxi drivers.

2.2 Conceptual Framework

Figure 1 shows the conceptual framework.

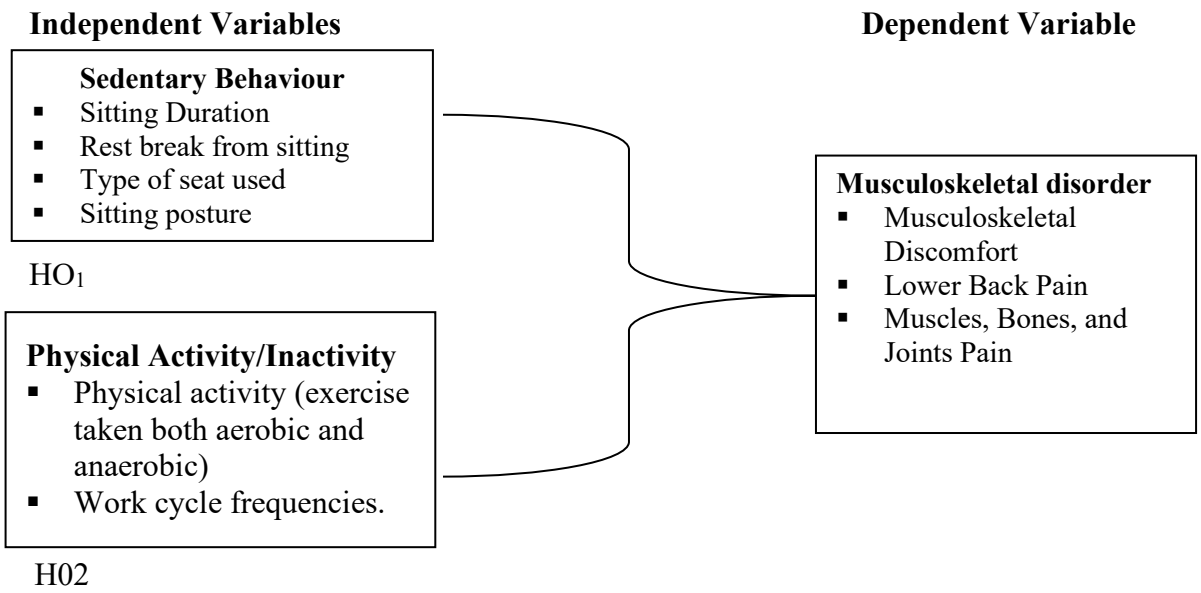

Figure 1: The Influence of Prolonged Sitting and Physical Inactivity on Musculoskeletal Conditions (Source: Adapted from Ostbye et al., 2018).

The conceptual framework for this study is informed by empirical evidence showing that prolonged sitting, sedentary behaviour, poor ergonomics, and low physical activity significantly increase MSD risk among professional drivers (Hakim & Mohsen, 2017; Dagenais et al., 2015; Standen et al., 2020). Long driving hours lead to muscle fatigue, spinal stress, and diminished circulation, which heighten susceptibility to low back pain and other MSDs (Wang et al., 2017). Additionally, exposure to whole-body vibration, awkward postures, restricted movement, and limited opportunities for physical activity further contribute to musculoskeletal strain (Feng et al., 2016). In Nairobi, taxi drivers often work extended shifts, occasionally exceeding eight hours a day, which increases cumulative physical load. These occupational demands expose drivers to a combination of ergonomic stressors and sedentary lifestyles, placing them at substantial risk of MSDs. Physical inactivity outside work further compounds this risk.

The conceptual framework thus positions prolonged sitting, sedentary behaviour, ergonomic exposures, and physical inactivity as independent variables that influence the dependent variable prevalence of musculoskeletal disorders. As shown in the conceptual model, MSDs among taxi drivers arise from cumulative exposure to prolonged sitting, constrained postures, and inadequate physical activity. The nature of taxi work demands long periods of immobility, leading to muscle fatigue, spinal compression, and decreased flexibility. Over time, these factors accumulate mechanical stress on the musculoskeletal system, increasing the likelihood of MSDs. This framework is consistent with global and regional studies linking sedentary driving occupations with musculoskeletal problems.

2.3 Literature Review

This literature review examines the prevalence of musculoskeletal disorders (MSDs), sedentary behaviour, and physical activity patterns in occupational groups, with a particular focus on taxi drivers. Globally, taxi driving is recognized as a high-risk occupation due to prolonged sitting, poor ergonomics, limited physical activity, and exposure to whole-body vibration. Understanding these risk factors among taxi drivers in Nairobi is essential, given the absence of local studies documenting their musculoskeletal health status. Therefore, the reviewed literature explores:

(1) Physical inactivity and sedentary behaviour among workers,

(2) Sedentary behaviour and physical activity patterns among drivers, and

(3) Prevalence of MSDs among professional drivers, to provide a strong empirical basis for investigating these health risks in Kenya.

Physical Inactivity and Sedentary Behaviour Patterns Among Adult Workers

Globally, physical inactivity has become a major public health concern. The World Health Organization (2018) defines physical activity as any bodily movement that requires energy expenditure. Despite this, 23.3% of adults worldwide are physically inactive (Sallis et al., 2016). WHO (2020) further reports that 1.4 billion adults do not meet minimum activity guidelines, with higher inactivity rates in high-income countries. Physical inactivity is strongly linked to chronic diseases such as cardiovascular disorders, diabetes, osteoporosis, and cancer (Hruby & Hu, 2015), highlighting the need for interventions.

Scholars differentiate between physical inactivity (not meeting activity guidelines) and sedentary behaviour, which is prolonged sitting with minimal energy expenditure (Patterson et al., 2017). This distinction is critical in driving-related occupations, where individuals may meet physical activity guidelines yet still experience long, uninterrupted periods of sitting, making them both inactive and sedentary.

Sedentary Behaviour Patterns

Sedentary behaviour has increased globally due to shifts from manual to office-basedand increasingly transport-based occupations. A study in Canada found that sedentary time increased by 20% between 2003 and 2012, largely due to changes in occupational patterns (Colley et al., 2015). Contemporary workers spend approximately 75% of their workday sitting, often in long, uninterrupted bouts (Carson et al., 2015). Sedentary behaviour is thus recognized as a modifiable occupational risk factor (Clemes et al., 2016), making taxi drivers a priority group for research.

Sedentary Behaviour and Physical Activity Among Drivers

Globally, drivers are among the most sedentary occupational groups. A study in the UK found that motor vehicle users across all age groups had higher sedentary time than non-drivers (Hajna et al., 2019). Prince et al. (2019) similarly noted that drivers were among the least physically active employees across occupational categories.

Taxi drivers, in particular, show extremely low levels of physical activity: among Pakistani immigrant taxi drivers in Norway, cardiorespiratory fitness was low, and 76% were overweight (Andersen et al., 2011). In Colombia, only 19.3% engaged in intense physical activity, and 16.5% reported no physical activity at all (Melo-Betancourt et al., 2020).

These findings illustrate how the nature of long hours, confined spaces, and shift-based work directly contributes to sedentary lifestyles, increasing the risk of musculoskeletal disorders.

Work-Related Musculoskeletal Disorders

Musculoskeletal disorders involve injuries or degeneration of muscles, tendons, ligaments, nerves, joints, and spinal structures (Duffield et al., 2017). Globally, MSDs reduce functional capacity, impair mental health, and increase healthcare and disability-related costs (Dagenais, Caro & Haldeman, 2015). Occupational MSDs are commonly associated with prolonged sitting, awkward postures, and repetitive movements, all key characteristics of taxi driving (Carson et al., 2015; Wanamo et al., 2017).

Musculoskeletal Disorders Among Drivers

Professional drivers are consistently reported to have one of the highest prevalence rates of musculoskeletal disorders (MSDs), a trend widely attributed to multiple interacting occupational risk factors. Prolonged sitting and static postures continuously strain the lower back, neck, and shoulders, while poor vehicle ergonomics, such as inadequate seat design, suboptimal steering wheel positioning, and limited lumbar support, further exacerbate biomechanical stress (Noda et al., 2015). In addition, restricted opportunities for physical activity during long shifts reduce muscular flexibility and resilience, increasing susceptibility to MSDs. Repetitive driving movements, including frequent gear shifting, braking, and steering, contribute to cumulative micro-trauma in the upper limbs. Long daily driving hours intensify fatigue and diminish the body's ability to recover from strain. At the same time,

exposure to whole-body vibration from poorly maintained roads or vehicles accelerates spinal degeneration and discomfort. Together, these factors create a high-risk occupational environment in which drivers are continually exposed to physical stressors that significantly elevate their likelihood of developing MSDs. Wanamo et al. (2017) found that age, years of driving, and poor posture significantly predicted MSD risk among drivers. In Singapore, Lee et al. (2018) reported high MSD prevalence linked to prolonged sitting and awkward postures. Urban drivers frequently report pain in the lower back, shoulders, and neck (Lin et al., 2016). Globally, MSD prevalence among drivers ranges from 34% to 91%, with low back pain being the most common complaint (Bener et al., 2019). Kapoor et al. (2020) found 60.7% prevalence of low back pain among professional drivers, especially those with long "waiting time" between passenger pickups. These findings demonstrate that the nature of taxi driving predisposes drivers to MSDs and underscores the need for occupational health interventions.

Musculoskeletal Disorders and Sedentary Behaviour in Africa

African studies report similar trends, with taxi and bus drivers experiencing high MSD prevalence due to poor road conditions, long working hours, and limited ergonomic regulation. For example, studies in Ethiopia, Nigeria, and Ghana report MSD prevalence rates between 45% and 86%, with low back pain being the most reported symptom. African transport workers also exhibit low levels of physical activity due to long shifts and limited opportunities for exercise.

Musculoskeletal Disorders and Physical Activity Among Drivers in Kenya

In Kenya, limited empirical research exists on sedentary behaviour and MSDs among taxi drivers. Studies in related sectors—matatu operators, long-distance truck drivers, and boda boda riders—suggest significant occupational health risks linked to prolonged sitting and poor ergonomics (Ochieng, Mwangi & Njoroge, 2017). However, no published study has documented MSD prevalence, sedentary behaviour, or physical activity patterns among Nairobi taxi drivers, highlighting a major research gap.

3. Methodology

This study adopted a cross-sectional analytical survey design, which was appropriate for examining the prevalence and patterns of musculoskeletal disorders (MSDs), sedentary behaviour, and physical activity among taxi drivers in Nairobi, Kenya. A cross-sectional design allows for data collection at a single point in time, facilitating the assessment of relationships between prolonged sitting, sedentary behaviour, physical inactivity, and the occurrence of MSDs (Mugenda & Mugenda, 2003). This design also supports the integration of quantitative methods to measure and analyze the direction, strength, and magnitude of associations among the study variables (Cooper & Schindler, 2010; Hair et al., 2006).

3.1 Measurement of Variables

The study variables were categorized into independent and dependent variables, with their specific operationalizations shown in Table 1.

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Table 1: Measurement of Variables

Variable	Category	Operationalization	Measurement Scale
Prolonged Sitting (X1)	Independent	Sitting duration, rest breaks from sitting	Ordinal, 5-point Likert scale
Sedentary Behaviour (X2)	Independent	Type of seat used, sitting posture	Nominal
Physical Inactivity (X3)	Independent	Physical activity level (aerobic and anaerobic)	Ordinal, 5-point Likert scale
Musculoskeletal Disorders (Y)	Dependent	Musculoskeletal discomfort, low back pain, muscle/joint pain	Ordinal, 5-point Likert scale

The study was conducted in Nairobi City County, Kenya, a cosmopolitan city with a high demand for taxi services and a substantial number of professional taxi drivers. Nairobi was chosen because it hosts the largest concentration of metered and app-based taxi services in the country (Ochieng, Mwangi, & Njoroge, 2017).

The study targeted 948 taxi drivers employed by the top 10 registered taxi companies in Nairobi, as identified by the Kenya Taxi Cab Association (2019). Drivers included in the study had at least 2 years of driving experience and were aged 18 or older. Drivers with pre-existing chronic conditions such as diabetes, hypertension, cardiac disease, or prior musculoskeletal injuries were excluded.

3.2 Sampling Techniques and Sample Size

A simple random sampling technique was used to select 200 taxi drivers proportionately from the top 10 companies (Table 2), ensuring equal representation from each company. A 20% sample from each company was selected based on the total number of drivers employed.

Table 2: Sample Size Calculation

Taxi Company	Drivers	Multiplier	Sample Size
Uber	118	0.20	24
Taxify	115	0.20	23
Little Cab	97	0.20	19
Pewin Cabs	107	0.20	21
Delight Cabs Ltd	93	0.20	19
Jatco Tours & Taxis	91	0.20	18
Jimcab Services	87	0.20	17
Kenatco Taxis	73	0.20	15
Absolute Cabs	79	0.20	16
Universal Cabs Ltd	88	0.20	18
Total	948		**200**

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3.3 Research Instruments

Data for this study were collected using validated self-administered questionnaires. The Global Physical Activity Questionnaire (GPAQ) was used to assess the physical activity levels of the taxi drivers, capturing information on the intensity, duration, and frequency of their daily activities. The Cornell Musculoskeletal Disorder Questionnaire (CMDQ) measured the presence, location, and severity of musculoskeletal pain and discomfort among participants. To evaluate time spent in sedentary work, the Occupation Sitting and Physical Activity Questionnaire (OSPAQ) was administered, providing insight into daily work-related sitting time. Additionally, the Sedentary Behaviour Questionnaire (SBQ) was used to examine participants' sitting postures and broader sedentary behaviour patterns. The overall questionnaire was structured into distinct sections to ensure comprehensive data collection, covering socio-demographic characteristics, patterns of prolonged sitting and sedentary behaviour, levels of physical activity, and the prevalence of musculoskeletal disorders among the taxi drivers.

The questionnaires were pre-tested among 10 taxi drivers from a company not included in the main study. Cronbach's alpha was 0.818, indicating excellent reliability (Mugenda & Mugenda, 2013).

3.4 Data Analysis

Data were coded and analyzed using SPSS v24. Descriptive statistics (frequencies, percentages, means, and standard deviations) described the prevalence of MSDs, sedentary behaviour, and physical activity patterns. Inferential statistics, including Chi-square tests and logistic regression, were used to assess associations between prolonged sitting, sedentary behaviour, physical inactivity, and musculoskeletal disorders.

4. Results

The study sought to determine the prevalence and distribution of musculoskeletal disorders (MSDs) among taxi drivers in Nairobi, Kenya.

Table 3: Prevalence of Musculoskeletal Disorders by Body Site among Taxi Drivers

Pain area response	Response			
	Yes		No	
	N	%	N	%
Low back	113	60%	76	40%
Hips	100	52.9%	89	47.1%
Forearm	65	34.4%	124	65.6%
Upper back	82	43.4%	107	56.6%
Knees	99	52.4%	90	47.6%
Shoulder	28	14.8%	161	85.2%
Thigh	75	39.7%	114	60.3%
Upper arm	45	23.3%	144	76.7 %
Lower leg	58	30.7%	131	69.3 %
Wrist	59	31.2%	130	68.8%
Neck	52	27.5%	137	72.5%

Findings indicate that MSDs are common in this occupational group, with lower back pain being the most frequently reported condition, affecting 113 drivers (60%). Hip pain was the second most prevalent, reported by 100 drivers (52.9%), while shoulder pain was the least reported, affecting only 28 drivers (14.8%). Other commonly reported areas of discomfort included the knees (52.4%), upper back (43.4%), thighs (39.7%), forearms (34.4%), wrists (31.2%), lower legs (30.7%), upper arms (23.3%), and neck (27.5%), highlighting that MSDs among taxi drivers are widespread and affect multiple regions of the body. Further analysis examined the relationship between years of driving experience and reported musculoskeletal discomfort. Results showed that drivers with 5–6 years of experience reported the highest number of MSD cases (356), followed by those with 7–9 years of experience (202). Drivers with 2–4 years of experience reported fewer cases (198), while those with 10 or more years of driving reported the least number of MSDs (35). This trend suggests that musculoskeletal discomfort increases with cumulative driving experience up to a point but may plateau or decrease among drivers with very long tenure, possibly due to adaptation, changes in work patterns, or attrition from the profession due to health issues. Overall, the findings underscore that prolonged sitting, repetitive driving motions, and the sedentary nature of taxi driving contribute significantly to musculoskeletal pain, emphasizing the need for targeted occupational health interventions among Nairobi's taxi drivers.

5. Discussion of Findings

The findings of this study provide a detailed characterization of taxi drivers in Nairobi, Kenya, and highlight the prevalence of musculoskeletal disorders (MSDs) within this occupational group. The majority of drivers in the top 10 taxi companies were male (87.8%), with females representing only 12.2% of the workforce. This gender disparity may reflect broader social and occupational dynamics, including reported wage gaps and potential discrimination against women in the transportation sector, as documented by the National Women's Law Center (2017). The age distribution of taxi drivers revealed that most drivers were between 31 and 35 years old (35.4%), suggesting that taxi driving may serve as a second career for individuals transitioning from other professions or as a flexible option for those balancing family responsibilities, consistent with findings by Helling et al. (2018) and Ahn et al. (2018). Additionally, most drivers had worked in the profession for 4–6 years (45%), aligning with international trends where the average tenure of taxi drivers is around 4.32 years (Han, Kim, & Lee, 2017).

The prevalence of musculoskeletal conditions among Nairobi taxi drivers was substantial, with 42.2% of participants reporting pain or discomfort in at least one body region. Low back pain was the most commonly reported condition, affecting 60% of drivers, followed by hip pain (52.9%), knee pain (52.4%), and upper back pain (43.4%). Less frequently reported areas of discomfort included the shoulders (14.8%), upper arms (23.3%), and wrists (31.2%). These results indicate that prolonged sitting, static postures, repetitive driving motions, and limited physical activity contribute significantly to the development of MSDs in this occupational group.

Although the prevalence observed in Nairobi was lower than reported in other African and global contexts; 86.8% in Cameroon (Tchounga et al., 2022), 70.5% in Ghana (Abledu et al., 2014), 89.3% in Nigeria (Akinpelu et al., 2011), and 76.5% in Turkey (Oz, Dogan, & Caglar, 2014), the findings are consistent with the global trend of high MSD rates among professional

drivers, which range from 53% to 91% (Minetto, 2020). The Nairobi study corroborates international evidence that low back pain is the most prevalent MSD symptom among taxi drivers, while other regions, such as Iran, report neck pain as more common (Kabir-Mokamelkhah et al., 2017). Overall, the study underscores that taxi drivers in Nairobi are exposed to occupational risks that predispose them to MSDs, and the prevalence of these conditions highlights the need for preventive interventions, ergonomic improvements, and targeted occupational health policies within the local taxi industry.

6. Conclusion

The study established a high prevalence of musculoskeletal disorders among taxi drivers in Nairobi, primarily affecting the lower back and hips, driven by prolonged sitting, sedentary behaviour, and limited physical activity. These findings underscore the need for targeted ergonomic, occupational health, and policy interventions to protect drivers' well-being and improve workplace conditions.

7. Recommendations

The development and implementation of public health interventions to address the high prevalence of physical inactivity, sedentary behavior, and prolonged sitting among taxi drivers in Nairobi County, Kenya, should be spearheaded by the Ministry of Health. These interventions should prioritize creating awareness and providing education on the risks associated with these behaviours.

Additionally, they should provide workplace interventions, such as ergonomic assessments, ergonomic equipment, and education on the importance of taking regular breaks and stretching during work hours.

Future research should examine MSD prevalence among other professional driver categories in Kenya, such as truck drivers, long-distance bus drivers, motorcycle riders (boda boda), and delivery drivers, to compare risk patterns and identify occupation-specific vulnerabilities.

Since lower back pain emerged as the most frequently reported musculoskeletal problem among taxi drivers, further research should explore biomechanical, ergonomic, and behavioural factors contributing to this condition, including seat design, driving posture, and vibration exposure.

Assess the impact of ergonomic improvements, scheduled rest breaks, stretching programs, and physical activity interventions on reducing MSD prevalence among taxi drivers, providing evidence for scalable, evidence-based occupational health policies.

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