

RESEARCH PAPER

# Non-Specific Low Back Pain Among Professional Car Drivers: Structured Literature Review

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## ABSTRACT

**Background:** Non-specific low back pain (NSLBP) is one of the most common occupational musculoskeletal diseases of professional car drivers around the world. The nature of driving, with prolonged sitting, exposure to whole-body vibration, constrained postures, repetitive movements and psychosocial stress contribute to the development of low back pain and its persistence.

**Objective:** This review seeks to summarize available evidence relating to the prevalence of Non-Specific Low Back Pain in professional car drivers and to identify key risk factors of occupation and individual origin in the etiology of Non-Specific Low Back Pain.

**Methodology:** A structured literature search was performed using electronic databases such as PubMed, Scopus, Google Scholar and Science Direct. Studies published in English language and reporting prevalence data of Non-Specific Low Back Pain among professional car drivers were included. The selection process was according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

**Results:** The reviewed studies suggest that the prevalence of Non-Specific Low Back Pain in professional car drivers is close to 35 percent to above 80 percent depending on the region, study design, and evaluation tools. Major risk factors identified are prolonged duration of driving, poor ergonomics of the driving seat, whole-body vibration, advanced age, high body mass index and poor levels of physical activity. Psychosocial factors such as stress at work and irregular working hours are also significant factors. The results show Non-Specific Low Back Pain to be a significant occupational health issue among professional drivers.

**Conclusion:** Implementation of ergonomic interventions, regular physical activity, driver education, and regulations regarding driving for hours at a policy level are important in reducing the burden of Non-Specific Low Back Pain and improving occupational well-being in this population.

**Keywords:** Low back pain, non-specific low back pain, occupational health, prevalence, professional car drivers.

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## 1. INTRODUCTION

Low back pain (LBP) is a prevalent musculoskeletal disorder that presents with pain, discomfort, muscle tension, or stiffness in the anatomical area between the lower margin of the rib cage and the gluteal folds with or without radiation to the lower extremities. It is among the leading causes of disability worldwide and is associated with significant decreases in work productivity, absenteeism and healthcare expenditure. LBP can be divided according to the duration (acute, sub-acute or chronic) or etiology (specific or non-specific). Due to its high prevalence and its recurring occurrence, LBP is a major burden on individuals and healthcare systems and occupational sectors (especially those involving prolonged static postures and physical strain) (Chen et al., 2024; Jia et al., 2024; Pickard et al., 2022).

Non-specific low back pain (NSLBP) is low back pain for which no definite pathoanatomical cause could be identified through clinical or radiological assessment. It is responsible for most cases of LBP and is frequently associated with

mechanical stress, postural imbalance and lifestyle related factors rather than structural abnormalities. NSLBP is multifactorial in nature and it is influenced by physical, psychological and environmental factors. Due to its non-specific origin, management strategies often focus on the prevention, ergonomic correction and functional rehabilitation of the patient, rather than on cure. (Jia et al., 2024)

Professional car drivers are a high-risk occupational group for the development of NSLBP owing to constant exposure to unfavorable working conditions. Prolonged sitting for long hours causes an increase in loading of the spine and a decrease in the lumbar motion. In addition, exposure to whole body vibration, poor seat design, limited postures and repetitive driving tasks further aggravate biomechanical stress on the lumbar spine (Bovenzi et al., 1999; Robb et al., 2007). Psychosocial factors such as job stress, long working hours, irregular schedules, and the lack of opportunities for physical activity are also contributing factors for the onset

and persistence of low back pain in this population. (Chen et al., 2024; Wang et al., 2017; Pickard et al., 2022)

Although there have been many studies on low back pain in professional drivers, there is a considerable variation in the reported prevalence of NSLBP in different geographical areas and study settings. Variations in study design, assessment tools, sample characteristics and definitions of low back pain contribute to this inconsistency. Therefore, a review and synthesis of existing prevalence studies is necessary in order to gain an overall understanding of the burden of NSLBP across professional car drivers (Tamrin et al., 2007; Joseph et al., 2020). Such a review may help to identify frequent risk factors, identify gaps in the literature, and to help build effective preventive and occupational health interventions. The main purpose of this review is to examine and synthesize the existing literature for the systematic review related to the non-specific low back pain in professional car drivers. By reviewing observational and epidemiological studies, this review seeks to present an integrated picture of the current evidence of the occurrence of NSLBP in this particular occupational group. (Jia et al., 2024)

A further objective is to summarize and compare the reported prevalence of NSLBP among professional car drivers from different regions and study populations identified the occupational factors that contribute to the high burden of NSLBP. Understanding the variation in prevalence rates will help in assessing the magnitude of the problem and identify trends relating to occupational exposure, working conditions and demographic factors.

In addition, the general aim of this review is to identify commonly reported occupational, individual, and psychosocial risk factors associated with NSLBP in professional drivers. Recognizing these factors is important to guide future research, inform ergonomic interventions as well as policy-level strategies to reduce the burden of non-specific low back pain among this vulnerable occupational group. (Pickard et al., 2022; Alperovitch-Najenson et al., 2010; Ngatcha Tchounga et al., 2022)

## 2. LITERATURE REVIEW

### 2.1 Overview of Low Back Pain

Low back pain (LBP) is one of the most common musculoskeletal disorders worldwide and is a significant public health problem that affects people of all age groups and occupations. It is often said to be defined as pain, discomfort or stiffness localized in the lumbar region of the spine, accompanied often by limitations in movement and functional capacity (Chen et al., 2024; Bovenzi et al., 1999). Epidemiological studies are consistent in stating that a significant proportion of the world's population is affected by at least one episode of low back pain in their lifetime, with a good number of them developing recurrent or chronic symptoms. Due to its widespread nature and its recurring nature, LBP has been identified as a leading cause of disability worldwide. (Pickard et al., 2022)

From a global health point of view, low back pain is among the leading causes of years lived with disability (YLDs). Data from burden of disease studies across the world shows

that LBP occurs in both developed and developing countries, with rising prevalence in low- and middle-income countries as a result of urbanization, sedentary lifestyles and occupational changes. Unlike a number of communicable diseases, the prevalence of LBP does not decrease significantly with socioeconomic development and thus reflects its pernicious and universal character. The condition afflicts people during their most productive working years, which has an even greater impact on the society. (Jia et al., 2024)

The socioeconomic impact of low back pain is very profound and multifaceted. Direct healthcare costs are those relating to physician consultations, investigations, pharmacological therapy, physiotherapy and rehabilitation services. In addition to direct costs, there are indirect costs including work absenteeism, reduced productivity, presenteeism and early retirement contribute significantly to the overall economic burden. Occupational low back pain is a major cause of claims for compensation and long term work disability in many countries. For workers who spend their time in physically demanding or posture-intensive jobs through occupations like professional drivers, the financial implications are especially severe. (Abere et al., 2023)

Beyond economic implications, low back pain has a great impact on quality of life and psychosocial well-being. Chronic or recurrent pain may cause a decrease in physical activity, sleep disturbances, emotional stress, anxiety, and depression. These psychosocial factors may in turn contribute to further aggravate pain perception and contribute to a cycle of chronic disability. As a result, low back pain is increasingly being accepted not as a physical disorder but a biopsychosocial disorder in need of comprehensive preventive and management strategies. (Pickard et al., 2022)

### 2.2 Non-Specific Low Back Pain

Non-specific low back pain (NSLBP) is a generally term for low back pain that cannot be attributed to a specific and identifiable pathologic cause such as infection, malignancy, fracture, inflammatory disease or nerve root compression. Clinically, NSLBP is diagnosed when no definite structural and pathological abnormality can be identified based on medical history, physical examination and imaging investigations. It is the most common type of low back pain and makes up about 85 – 90. (Jia et al., 2024)

The clinical relevance of NSLBP is that it is multifactorial and heterogeneous. Unlike specific low back pain, which can often be associated with a clear diagnosis, NSLBP is a complex mechanical, occupational, lifestyle and psychosocial interaction (Kurtul & Güngördü, 2022). Mechanical loading of the spine, muscle fatigue, poor posture, decreased core strength, and repetitive movements are common ailments that are thought to be contributed factors. Psychological factors including stress, job dissatisfaction, anxiety and low levels of social support have also been demonstrated to have an effect on the onset and persistence of NSLBP. (Abere et al., 2023)

The lack of recognizable pathology from NSLBP poses great challenges to diagnosis, treatment and prevention.



**Table 1** Table Represents Studies on Non-Specific Low Back Pain among Professional Car Drivers

Author	Year	Country	Sample Size	Driver Type	Study Design	Prevalence of LBP	Key Risk Factor
Chen C et al.	2024	Multi nation countries	53 studies	Professional Drivers	Systematic review & Meta Analysis	53%( 12 Month Pooled)	Long Driving Hours,Prolonged Sitting, Vibration
Jia J et al.	2024	China	7723	Professional Drivers	Cross-sectional	53%	Driving Duration, Night Shifts, Low Physical Activity
M Wang et al.	2017	China	800	Taxi Drivers	Cross-sectional	54%(12 months)	Driving Duration, Night Shifts, Low Physical Activity
Kurtul et al.	2022	Turkey	447	Taxi Drivers	Cross-sectional	49.7%	High BMI,Poor Ergonomics, Physical Inactivity
Abere et al.	2023	Ethiopia	371	Taxi Drivers	Cross-sectional	85.7%(1 year)	Long Work Hours, Non Adjustable Seats, Alcohol Use
Begum et al.	2013	Bangladesh	246	Professional Car Drivers	Cross-sectional	78%(12 Months)	Years Of Driving, Prolonged Sitting
Faiyazi et al.	2026	India	353	Auto Rikshaw Drivers	Cross-sectional	48.2%	Lack Of Lumbar Support,Poor Seat Design
Nabi et al.	2023	Bangladesh	368	Professional Bus Drivers	Cross-sectional	34.5%(1 Month)	Poor Seat Condition, Long Working Hours
Jongprasitkul et al.	2023	Thailand	120	Motorcycle Taxi Drivers	Cross-sectional	58.3%	Extended Work Hours, Lifestyle Factors
Sharma et al.	2025	India	304	Dumper Operators	Cross-sectional	37%	Whole Body Vibration, Sustained Posture
Chen et al.	2005	USA	1242	Taxi Drivers	Cross-sectional	51%	Whole Body Vibration, Sustained Posture
Pikard et al.	2022	Australia	25 studies	Research Studies	Cross-sectional	0.9%	Poor Seat Condition, Long Working Hours

**Table 2** Table Represents AXIS Table( Appraisal Tool For Cross Sectional Studies) (Downes et al.,2016) (Where Y=YES,N=NO,U=UNCLEAR)

AXIS Items	Wang 2017	Kurtul 2022	Abere 2023	Begum 2013	Nabi 2023	Jia 2024	Jongprasitkul 2023	Sharma 2025	Faiyazi 2026	Chen 2005	Pikard 2022
Clear aims/objectives	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Appropriate study design	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Sample size justified	N	Y	N	N	Y	Y	Y	Y	Y	N	Y
Target population defined	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sample representative	Y	Y	Y	U	Y	Y	Y	Y	Y	U	Y
Selection process representative	Y	Y	Y	U	Y	Y	Y	Y	Y	U	Y
Measures appropriate to aims	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Valid measurement tools used	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Reliability of measures addressed	U	Y	U	U	Y	Y	Y	Y	Y	U	Y
Statistical significance assessed	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Appropriate statistical methods	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Confounders identified	U	Y	U	U	Y	Y	Y	Y	Y	U	Y
Confounders adjusted for	N	Y	N	N	Y	Y	Y	Y	Y	N	Y
Results clearly described	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Internal consistency of results	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Results applicable to population	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Study limitations discussed	U	Y	U	U	Y	Y	Y	Y	Y	U	Y
Funding/conflict declared	U	Y	U	U	Y	Y	Y	Y	Y	U	Y
Ethical approval reported	Y	Y	Y	U	Y	Y	Y	Y	Y	U	Y

Non-response bias addressed	N	Y	N	N	Y	Y	Y	Y	Y	N	Y
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International studies also support these results with studies from both developed and developing countries showing a persistently high prevalence of NSLBP in professional drivers. Studies undertaken in Asia, the Middle East, Europe and North America

point to similar occupational risk patterns with variations in the type of vehicles and road conditions. Long distance drivers and urban taxi drivers are also found to have higher prevalence rates because of long periods of driving, exposure to traffic related stress, and lack of time to rest.

Variation in prevalence can also be observed by the type of driver and the region. Taxi drivers, app-based cab drivers and long-haul drivers often experience higher rates of NSLBP than do short-distance or part-time drivers. Urban drivers may be exposed more to traffic congestion and stress whereas rural or highway drivers may be more exposed to vibration and long periods of uninterrupted driving. Regional variations in road infrastructure, ergonomics of vehicles, access to health care and regulation of occupations also make a difference in the prevalence estimates.

The wide variation in the reported prevalence demonstrates the need for standardised assessment tools and consistent definitions of non-specific low back pain. (Pickard et al., 2022)

Differences in recall periods, questionnaire design and pain severity thresholds make comparisons between studies difficult. Nevertheless, the general body of evidence clearly shows that NSLBP is very common in professional car drivers and a major occupational health issue. Solutions to this problem involve specific ergonomic interventions, regulations at a policy level with regard to working hours, and raising awareness about the use of preventive strategies among drivers. (Jia et al., 2024)

**2.5 Risk Factors Identified in Literature**

The reviewed literature shows consistent findings of several occupational, biomechanical, and lifestyle-related factors involved in the development of non-specific low back pain

(NSLBP) in professional car drivers. These risk factors often work together and result in mechanical stress on the lumbar spine as well as less ability by the body to heal from prolonged exposure. (Nahar et al., 2013)

Prolonged sitting is the most reported occupational risk factor. Professional drivers commonly spend long periods of time in a sitting position with poor breaks, causing excessive pressure in the intervertebral discs, less lumbar movement and muscle tired- ness. Sustained static posture also negatively affects blood circulation to structures in the spine which also contributes to pain and stiffness. (Wang et al., 2017)

Whole body vibration is another significant cause of NSLBP in drivers. Continuous exposure to vibration transmitted through the vehicle seat, increased especially on uneven road surfaces, causes accelerated spinal degeneration with increased com- pressive forces on the intervertebral discs. Studies regularly link greater exposure to vibration with greater rates and severity of low back pain. (Chen et al., 2005; Sharma et al., 2025)

Poor ergonomics such as poor seat design, lack of lumbar support, poor seat height, and poor driving posture has a significant impact on increased strain on the spine. Suboptimal ergonomic circumstances require drivers to maintain flexed or asymmetric postures for long periods of time with the added effects of musculoskeletal stress. (Kurtul & Gungördü, 2022; Faiyazi et al., 2026; Alperovitch-Najenson et al., 2010)

Lifestyle factors such as high body mass index (BMI), smoking, physical inactivity and poor overall fitness also plays an important role. These factors decrease muscular endurance and spinal stability and drivers are more likely to suffer from NSLBP. The interaction between occupational exposure and lifestyle habits emphasises the multifactorial nature of NSLBP amongst professional drivers. (Aberé et al., 2023; Jia et al., 2024)

**Table 3:** Common Risk Factors for Non-Specific Low Back Pain among Professional Drivers

Risk Factor	Description
Prolonged sitting	Long driving hours with limited posture variation and insufficient rest breaks
Whole-body vibration	Continuous exposure to vehicle-induced vibration transmitted through the seat
Poor ergonomics	Inadequate seat design, lack of lumbar support, improper posture
Lifestyle factors	High body mass index, smoking, physical inactivity, poor physical fitness

**3. METHODOLOGY**

The current review has been carried out in a structured and

systematic way to identify, select and synthesize published literature on the prevalence of non-specific low back pain (NSLBP) among professional car drivers. The methodology was designed to ensure that the studies were transparent, reproducible and covered the relevant studies in a thorough manner. Established guidelines for systematic and narrative reviews were followed in order to reduce bias and increase the reliability of the findings.

**3.1 Data Sources**

A thorough literature search was performed with the use of several electronic databases to include a wide variety of studies concerning occupational low back pain. The databases that imply rich coverage of the biomedical, public health, and occupational health literature were chosen. These included Google Scholar, PubMed, Scopus, and Science Direct.

Google Scholar was used to identify a broad range of scholarly articles that include selection from peer-reviewed journals and institutional publications. PubMed was used for its large biomedical database, especially for research concerning the musculoskeletal problems and occupational health. Scopus was a source of access to multidisciplinary research with strong citation tracking, and ScienceDirect was a source of full text access to high quality journals in health sciences and ergonomics. Using multiple databases improved the chances of not missing relevant studies and increased the comprehensiveness of the review. (Jia et al., 2024)

**3.2 Search Strategy**

A structured search strategy was conducted (using relevant keywords and Boolean operators) to retrieve studies in accordance with the goals of the review. The main keywords were "low back pain", "non specific low back pain", "professional car drivers", "taxi drivers", "chauffeurs", "occupational low back pain", and "prevalence". These terms were combined using Boolean Operators such as AND and OR to refine search results to ensure that studies covering both the condition and the target population were identified. (Chen et al., 2024)

The search was limited to studies published in the English language to ensure consistent and accurate interpretation. To make sure that the relevance and currency of the findings are considered, studies published within a defined time period (for example, 2015 to 2024) were considered. This time frame was selected to include recent occupational trends, changes in driving patterns, and advancements in ergonomic awareness. In addition to search results from the database search, the reference lists of selected articles were screened manually for additional relevant studies that may have not been identified through the electronic database searches. (Jia et al., 2024)

**3.3 Inclusion Criteria and Exclusion Criteria**

Clear and defined inclusion and exclusion criteria were used to ensure that only relevant and high-quality studies were included in the review.

**Inclusion criteria were:**

1. Studies that targeted professional car drivers as study population, and reported the prevalence of non-specific low back pain.
2. Observational study designs, including cross-sectional study, descriptive study and cohort study were included, since they are suitable for determining prevalence.
3. Studies done in any geographical region were considered in order to offer a global view of the burden of NSLBP among professional drivers.

**Exclusion criteria were:**

1. It used for discarding studies that were not in line with the objectives of the review.
2. Studies of specific pathologies of the spine, including disc herniation, spinal fractures, inflammatory diseases of the spine, malignancies, or post- surgical low back pain, were excluded.
3. Research for non-driving occupations were also excluded.
4. In addition, case reports, editorials, conference abstracts, review articles and studies that did not provide clear data on the prevalence were not included in the final synthesis.

The selection process of the studies was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A PRISMA flowchart was used to document the process of selection (identification, screening, eligibility assessment and final inclusion of studies) in a systematic manner. (Pickard et al., 2022)

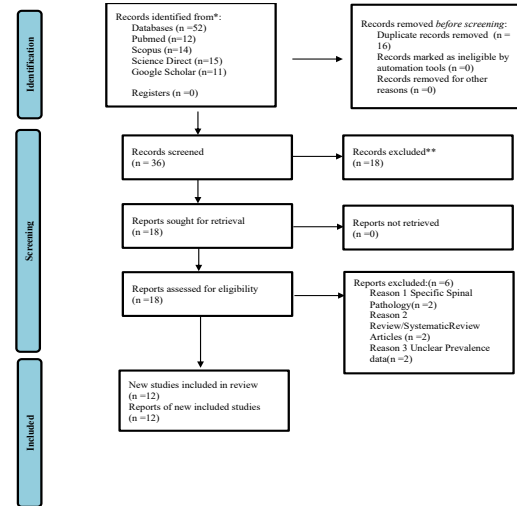


Fig. 1 Flowchart of Literature Selection Process (PRISMA) (Page et al., 2021)

**Fig. 1** Flowchart of Literature Selection Process (PRISMA) (Page et al., 2021)

Initially, records were identified by database searching of

the selected electronic sources. Duplicate records were eliminated before screening. The titles and abstract of the remaining studies were then screened to exclude articles that were obviously unrelated to the topic of the review. Full-text articles of studies that might meet inclusion and exclusion criteria were then evaluated against the predefined inclusion and exclusion criteria.

Studies that were eligible for inclusion were included in the final qualitative synthesis. Reasons for exclusion at the full-text stage were non-relevant study populations, missing prevalence data or studies focusing on specific spinal disorders. The PRISMA flowchart offers a transparent visual method of displaying the selection process and adds methodological rigor and reproducibility to the review.

### 3.4 Estimates of Prevalence

Prevalence is one of the basic epidemiological measures, used to estimate the percentage of people which are affected by a particular condition in a specific population at a particular time. In studies that measure the prevalence of non-specific low back pain in professional car drivers, prevalence is an estimate of the total burden of the disease in this occupational group.

The prevalence of NSLBP is the proportion or percentage of number of drivers diagnosed or reporting non-specific low back pain to the total number of drivers studied. This measure is used extensively in cross-sectional and descriptive epidemiological studies, in order to compare populations and regions.

$$\text{Prevalence (\%)} = \frac{\text{Number of drivers with NSLBP}}{\text{Total number of studies}} \times 100$$

This equation is usually used in epidemiological studies of prevalence to determine the proportion of a population affected by non-specific low back pain. It provides a means of standard reporting and comparison of the prevalence estimates of the different studies and occupations.

## 4. DISCUSSION

The present review draws attention to an ever high prevalence of NSLBP in professional car drivers, confirming NSLBP to be a significant occupational health problem in these drivers. Across reviewed studies, there was a general estimate of moderate to very high levels of prevalence, with many studies estimating a prevalence of low back pain of more than half of drivers surveyed (Bovenzi et al., 1999; Robb et al., 2007). This trend indicates the occupational demands of professional driving puts individuals at sustained risk of development of musculoskeletal disorders, especially in the lumbar region. The high prevalence rates in recent research suggest that in spite of greater awareness about occupational health issues, effective preventive measures are not adequate in most settings. (Chen et al., 2024; Abere et al., 2023)

Interpretation of prevalence trends suggests that the duration of driving, cumulative years of driving exposure and increasing urbanization are major contributors to the burden of NSLBP. Studies published in more recent years

tend to report higher rates of prevalence, which may reflect longer working hours, increased traffic congestion and the growth of app-based taxi services requiring longer periods of time spent sitting. In addition, better reporting and increased awareness of musculoskeletal symptoms may have contributed to increased prevalence estimates. Nevertheless, the similarity of findings obtained in different time periods highlights the pervasiveness of NSLBP in professional drivers. (Wang et al., 2017; Sharma et al., 2025)

Comparison between regions papers the great variance in prevalence estimations. Studies have been done in low and middle income countries and these have often shown a higher prevalence of NSLBP than studies from high income countries. This disparity may be explained by variations in road infrastructure, vehicle ergonomics, the enforcement of occupational safety regulations and access to healthcare services. Drivers in developing regions tend to have longer working hours, poorer seat design and higher whole body vibration, which bring higher risks of low back pain. Conversely, lower prevalence rates reported among some developed countries may indicate better ergonomic standards, regular health screening and better occupational safety policies. From an occupational health perspective, the results of this review may have important implications. The high proportion of NSLBP among professional car drivers demonstrates the need for special preventive measures, both on an individual or organizational level. Ergonomic interventions, such as better seat design and adjustable lumbar support, frequent rest breaks and education about proper posture. Additionally, occupational health policies should also emphasize on hours of driving, promotion of physical activity and routine musculoskeletal health assessments. Addressing both the physical and psychosocial risk factors is important in reducing the burden of NSLBP and enhancing the long-term health and productivity of the professional drivers. (Nahar et al., 2013; Kurtul & Güngördü, 2022)

## 5. RESEARCH GAPS

Despite the increasing literature base on non-specific low back pain (NSLBP) among professional car drivers, there are a number of important gaps in research. Addressing these gaps is important for the better understanding, prevention and management of NSLBP in this high-risk occupational group.

One big limitation that the existing literature is found to have is the lack of longitudinal evidence. Most of the studies that were included in this review were of a cross-sectional design, which is useful for estimating prevalence but does not allow for the evaluation of causal relationships or changes in symptoms over time. The lack of longitudinal and prospective cohort studies results in a lack of knowledge regarding the effects of prolonged driving exposure and years of service accumulated and changes in working environment and its role in the development of NSLBP in time. Longitudinal research is required to better understand risk trajectories and to assess the long-term effectiveness of preventive interventions. (Jia et al., 2024) Another interesting gap is the lack of standardised pain

assessment methods between studies. Considerable variation exists in the tools used to assess low back pain including self-reported questionnaires, visual analog scales and disability indices. Differences in recall periods, pain definitions and severity thresholds render comparisons of prevalence estimates from different studies and regions difficult. The lack of standardized and universally accepted assessment instruments for NSLBP in the workplace decreases consistency and reliability of reported findings. (Chen et al., 2024; Pickard et al., 2022)

Furthermore, there is an evident lack of studies from developing countries, especially those regions where professional driving is one of the more common occupations and where working conditions are often more challenging. Limited research from low- and middle-income countries limits the generalisability of the research and may underestimate the actual global burden of NSLBP among professional drivers. Increased research efforts in these regions are required in order to capture diverse occupational environments and inform region-specific interventions that can contribute to equitable occupational health policies. (Abera et al., 2023; Nabi et al., 2023)

## 6. IMPLICATIONS AND RECOMMENDATIONS

The results of this review have important implications in occupational health practice, policy development and future research dedicated to reducing the burden of non-specific low back pain (NSLBP) among professional car drivers. Given the high prevalence of NSLBP consistently found across studies, it is important to have a multifaceted approach including ergonomic, educational and policy level interventions. Ergonomic issues are an important intervention for preventing and managing NSLBP in professional drivers. Vehicle design needs to focus on adjustable seating systems with adequate lumbar support, seat height and vibration-dampening features. Proper steering wheel placement and adequate cabin space can help drivers maintain neutral postures and avoid spinal strain. Employers and transport service providers should ensure that vehicle seat maintenance is undertaken on a regular basis, and encourage ergonomic evaluation that will identify and correct postural risks. Easy measures such as promoting change of posture at regular intervals and short stretching exercises during prolonged periods of driving can go a long way in alleviating musculoskeletal stress. (Kurtul & Güngördü, 2022)

Driver health awareness programs are also equally important in addressing NSLBP. Educational programs on correct sitting position, safe driving ergonomics and importance of regular physical activity can improve self-management skills of drivers. Programs that promote core strengthening exercises, weight control, smoking cessation and stress reduction may reduce susceptibility to low back pain even further. Periodic health screening and timely reporting of symptoms can help in the timely intervention and prevention of progression to chronic pain and disability. (Faiyazi et al., 2026)

At a broader level, interventions at the policy level are required to support sustainable occupational health

outcomes. Regulations that restrict the number of hours a person may drive per day and require rest breaks and enforce restrictions on occupational safety may help reduce prolonged exposure to risk factors. Inclusion of musculoskeletal health guidelines in transport and labor policies and employer accountability for well-being of drivers is of utmost importance. Collaborative efforts of policymakers, employers, healthcare professionals, and drivers are needed for implementation of effective, evidence-based strategies to mitigate the occupational burden of NSLBP. (Chen et al., 2024; Jia et al., 2024)

## 7. LIMITATIONS OF THE REVIEW

Despite including a comprehensive synthesis of a wide range of available literature on non-specific low back pain (NSLBP) in professional car drivers, this review has some limitations that should be considered when interpreting the results.

First, the review relies on published studies and this may cause publication bias. Studies which report significant or high prevalence estimates are more likely to be published than studies with non-significant results, including the possibility that the true burden of NSLBP is overestimated. Additionally, unpublished data, grey literature and reports from occupational health organizations were not systematically included and this may reduce the completeness of the evidence base. (Chen et al., 2024) Second, there is considerable heterogeneity between the included studies in terms of study design, sample size, driver categories, assessment tools and definition of non-specific low back pain. Variations in the recall periods, measurement instruments and severity thresholds make direct comparison between studies difficult. This heterogeneity restricted the choice of quantitative synthesis or meta-analysis and required a mainly descriptive approach to the interpretation of data. (Pickard et al., 2022)

Finally, there are language limitations, which is another important constraint. Only studies published in the English language were included in the review. As a result, relevant research published in other languages was possibly excluded, especially from areas where professional driving is common and where working conditions are substantially different. This might be a limitation that impacts the generalizability of the results, and highlights the importance of including more inclusive reviews studying multilingual sources in the future. (Pickard et al., 2022)

## 8. CONCLUSION

This review drew together available evidence on the non-specific low back pain (NSLBP) in professional car drivers and identified the occupational factors that contribute to the high burden of NSLBP. The reviewed literature shows a consistent demonstration that NSLBP is a common musculoskeletal disorder in this occupational group, with prevalence rates often higher than found in the general population. Prolonged sitting, whole-body vibration, poor ergonomic conditions, and adverse lifestyle factors were the most reported risk factors in studies conducted in different regions. (Chen et al., 2024)

The results show a high rate of NSLBP in a professional driving population, thus stressing the occupational character of NSLBP. Differences in prevalence between regions and categories of driver are reflecting differences in working conditions, duration of driving, vehicle ergonomics and regulatory environment. Despite the differences in methodology between studies, overall the evidence seems clear that there is an association between professional driving and the risk of developing non-specific low back pain. (Jia et al., 2024)

The review highlights the importance of the need for preventive strategies to tackle this occupational health challenge. Ergonomic improvements in vehicle design, driver education and health awareness program implementation and policy-level interventions to regulate driving hours and rest breaks are important to reduce exposure to risk factors. Future research efforts should prioritize longitudinal research designs, standardize tools of assessment and examine underrepresented populations in order to build a stronger evidence base and promote the implementation of effective and sustainable prevention strategies. Addressing NSLBP in professional car drivers is essential to increase occupational well-being, productivity and long-term health status. (Pickard et al., 2022)

## 9 Acknowledgment

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