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Adesola Ojo, Ojoawo, Mbada, Chidozie Emmanuel, Oladele, Timilehin, Haruna, Moda, Idowu, Opeyemi Ayodiipo, Sonuga, Ademola and Fatoye, Francis (2021) Prevalence, Risk Factors and Health Care Service Utilization for Low-Back Pain among Nigerian Automobile Technicians. Journal of Musculoskeletal Disorders and Treatment, 7 (1).

**DOI:** <https://doi.org/10.23937/2572-3243.1510092>

**Publisher:** ClinMed International Library

**Version:** Published Version

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## ORIGINAL ARTICLE

# Prevalence, Risk Factors and Health Care Service Utilization for Low-Back Pain among Nigerian Automobile Technicians

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## Abstract

**Background:** Automobile technicians in resource-limited countries depend more on manual than mechanized approach in their work, and as such, may be at high risk for musculoskeletal disorders such as low back pain (LBP). This study was aimed to investigate the prevalence, risk factors and health care service utilization for LBP among Nigerian automobile technicians.

**Methods:** A total of 240 members of the National Association of Automobile Technicians responded in this survey. A previously validated instrument on prevalence, risk factors and health-care-service utilization for LBP was adapted in this study. Data was analysed using descriptive and inferential statistics. Alpha level was set at  $p < 0.05$ .

**Results:** Twelve-month and point prevalence of LBP were 79.2% and 75%. On-going LBP was associated with work-related poor posture (46.7%), trauma (13.9%) and lifting of loads (11.7%).

LBP mostly led to absenteeism from work (46.8%) and consultation with health practitioners (73.7%). 40% of respondents agreed to have incurred about N1000-N5000 as treatment cost, and 38.7% of the respondents lost about N5000-N10000 as estimated cost in terms of lost hours. Type of automobile activity engaged in ( $p = 0.483$ ), frequent bending ( $p = 0.217$ ), lifting objects weighing up to 5 kg ( $p = 0.071$ ) or up to 25 kg ( $p = 0.719$ ) and sustained sitting ( $p = 0.349$ ) or standing ( $p = 0.996$ ) were not significantly associated with prevalence of LBP.

In the bivariate analysis, age ( $\chi^2 = 3.298$ ,  $P = 0.192$ ), marital status ( $\chi^2 = 0.098$ ,  $P = 0.754$ ), type of automobile repairs engaged in ( $\chi^2 = 0.493$ ,  $P = 0.483$ ), lifting objects up to 5 kg ( $\chi^2 = 3.269$ ,  $p = 0.071$ ), lifting objects up to 25 kg ( $\chi^2 = 0.130$ ,  $p = 0.719$ ), sustained sitting ( $\chi^2 = 0.840$ ,  $p = 0.349$ ), and sustained standing ( $\chi^2 = 0.002$ ,  $p = 0.996$ ) were not significantly associated with prevalence of LBP. Level of education ( $\chi^2 = 6.121$ ,  $p = 0.047$ ) was, however, associated with LBP prevalence, although this association was not sustained following logistic regression.

**Conclusion:** There is a high prevalence of LBP among Nigerian automobile technicians, and it results in work absenteeism, economic burden and increased need to seek health care.

## Keywords

Low back pain, Automobile mechanics, Risk factor, Adults

## Abbreviations

LBP: Low Back Pain

## Introduction

Low-back pain (LBP) is a common cause of disability among the working population [1,2]. LBP alongside neck pain is ranked fourth in terms of disability-adjusted life years in the Global Burden of Disease 2016 study [3].

LBP usually develops over time, and it can be intense and become a reason for frequent work absenteeism and restrictions [4,5], as well as, a cause for reduced quality of life and severe disability [6-8].

Low-back pain ranks among the most frequent conditions that are possible to be incurred during strenuous activities [9]. As such, rapid work pace and repetitive motion, forceful exertions, poor and prolonged body postures and vibration are often indicated as predisposing factors to LBP [10,11]. Earlier studies have sought to establish the prevalence of LBP among various occupational groups, including agricultural [12,13], construction [14,15], and health care [16,17] workers. While some occupational groups have received considerable attention in literature, others, such as automobile technicians [1], whose works involve intense manual labour, especially in resource-limited settings are yet to gain the desired investigations.

Automobile mechanics play a central role in diagnosing and fixing automobile problems. However, this role comes with the need to maintain awkward positions for a long period; lift heavy spare parts, and in some instances require manoeuvring of the parts to get the repairs done. These work descriptions highlight that automobile technicians constantly exert physical strength at the detriment of their musculoskeletal health [1,18,19]. Therefore, this study was aimed to investigate the prevalence, risk factors and health care service utilization for LBP among Nigerian automobile technicians.

## Methods

A cross-sectional survey of 240 registered members of National Association of Automobile Technicians, the coordinating association of automobile mechanics in Nigeria, was conducted. Individuals who had worked for more than a year before the commencement of this study, who could comprehend English or Yoruba language (a local language mostly spoken in South-west Nigeria), and have experienced LBP related to work exposure were included in the study. Automobile technicians who sustained any form of injury outside of auto mechanic duty with associated physical deformities (such as leg length discrepancy, scoliosis, and lordosis), and those with previous spinal surgery or with any form of back problem before they getting involved in automobile repair works were excluded from the study. Full disclosure on the purpose of the survey was given to eligible respondents, and their signed consents were obtained. Ethical approval was obtained from the Health Research and Ethics Committee (IPHOAU/12/723) of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife, Nigeria.

Based on Cochran's sample formula [20], the sample size for this study was calculated, as shown below:

$$n_0 = \frac{z^2 \times p \times q}{(e)^2}$$

Where  $n_0$  is the sample size;  $z$ -value is found in a  $Z$  table (1.96 for a confidence level of 95%);  $p$  is the (estimated) proportion of the population which has the attribute in question (0.2);  $q$  is  $1 - p$  ( $1 - 0.2 = 0.8$ ) and  $e$  is the desired level of precision (i.e. the margin of error = 0.05)

$$n_0 = \frac{(1.96)^2 \times 0.2 \times (1 - 0.2)}{(0.05)^2} = 246$$

Based on the calculated sample size, a total of 246 automobile technicians were invited into the study, however, only 240 responded, yielding a response rate of 97.6%.

This study adapted a survey instrument previously used by Bindra, et al. [21] to determine the prevalence, risk factors, impact, health care service utilization and back pain features. The instrument comprised of five sections. Section A considers demographic information (including age, level of education, marital status). Section B utilizes a pictorial diagram of the posterior view of a human being to extract information on pain pattern (including duration, nature, severity, and activities limited by the pain). Section C seeks information on the primary outcomes such as prevalence and impact of LBP (cost implication and activity limitation as a result of pain) from the respondents in the past 12 months. Section D seeks information on the health care services utilization for LBP, while Section E was about physical factors at work that might predispose to LBP. In addition, the Visual Analogue Scale (VAS), in which the respondents select a number on a scale from 0-10 integers that represent their current pain was used to assess pain intensity in this study [22]. Both tools were self-administered among the respondents.

Descriptive statistics of frequency, percentage, mean and standard deviation were used to summarize the data. Chi-square test was used to determine associations between prevalence of LBP, and respondents' socio-demographic factors (age, marital status, level of education) and job factors (the type of automobile engaged in and most common work activity). Factors with  $P$ -value less than 0.25 were entered into logistic regression to identify the effect of the independent variables on the outcome variable (prevalence of LBP). The strength of the association was presented by odds ratio and 95% confidence interval. A  $p$ -value of  $< 0.05$  was considered statistically significant. Data analysis was conducted using SPSS Statistics for Windows, version 23 (IBM Inc., Armonk, NY).

## Results

The mean age of the respondents (100% males) was  $44.98 \pm 6.70$  years (age ranging from 30 to 63 years). Majority of respondents were within 40-49 years age bracket (52.1%) and married (82.5%). All of the respondents (100%) were involved in activities that required frequent bending at work. The socio-demographic pro-

**Table 1:** Socio-demographic profile and job characteristics of the respondents.

Variables	Frequency	Percentage
Age		
30-39 years	59	24.6
40-49 years	125	52.1
50 years and above	56	23.3
Marital status		
Single	24	10.0
Married	198	82.5
Divorced	18	7.5
Level of education		
None	14	5.8
Primary	21	8.8
Secondary	158	66.8
Tertiary	47	19.6
Type of automobile engaged with		
Small cars	119	50.4
Big cars	121	49.6
Most common work activity		
Frequent bending	240	100
Lifting objects up to 5 kg	186	77.5
Lifting objects up to 25 kg	105	43.8
Sustained sitting	129	53.8
Sustained standing	159	66.3

file and job characteristics of the respondents are presented in [Table 1](#).

The twelve-month prevalence of LBP among the respondents was 79.2%. Single occurrence and one time or repeated recurrence of LBP in the past 12 months was 21.1% and 78.9%. Continuous lower body movement associated with work-place activities had negative impact on the back (95%) of respondents. Climbing stairs (52.1%), standing (48.8%), lying (48.8%) and stooping (45.8%) were the most affected activities by LBP during the past 12 months.

Eighty-nine (46.8%) of the respondents who had LBP in the past one year were absent from work, while 52.7% were away from work for over a month. Cost implications and activity limitation resulting from LBP in the past 12 months is reported in [Table 2](#). From the result, 40% and 35.8% of respondents agreed to have incurred about N1000-N5000 and N5000-N10000 respectively as treatment cost. Also, 35.5% and 38.7% of the respondents reported about N1000-N5000 and N5000-N10000 as estimated cost in terms of lost hours. 50.7% of the respondents had consulted a physiotherapist for their LBP ([Table 3](#)).

The point prevalence of LBP in this study was 75%. Respondents who had LBP in the past seven days believed it was caused by poor posture (46.7%), trauma (13.9%), lifting of loads (11.7%) and sudden movement

**Table 2:** Cost implications and activity limitation of respondents as a result of low back pain in the past 12 months.

Variable	Frequency	Percentage
(N = 190)		
Cost of treatment of LBP (In Naira)		
No cost	6	3.2
Less than N1000	40	21.1
N1000-N5000	76	40.0
N5000-N10000	68	35.8
Work absence		
Yes	93	48.9
No	97	51.1
N = 93		
Duration of work absence		
Less than 1 month	44	47.3
1-3 months	23	24.7
> 3 months	26	8.0
Estimated cost in terms of lost hours (In Naira)		
No cost	21	22.6
Less than N1000	3	3.2
N1000-N5000	33	35.5
N5000-N10000	36	38.7
Activities respondents had difficulty in carrying out when their back pain was at the worst during the past 12 months	Mild-Moderate	Severe-Extreme
	Frequency (%)	Frequency (%)

Walking	109 (57.4)	81 (42.6)
Sitting	113 (59.5)	77 (40.5)
Standing	98 (51.6)	92 (48.4)
Lying	98 (51.6)	92 (48.4)
Dressing	115 (60.5)	75 (39.5)
Stooping	103 (54.2)	87 (45.8)
Climbing stairs	91 (47.9)	99 (52.1)
Getting out of a chair	119 (62.6)	71 (37.4)

(\$1 is equivalent to N365).

**Table 3:** Utilization of health care services.

Variable	Frequency (N)	Percentage (%)
N = 190		
Consulted any health professional to take care of LBP		
Yes	140	73.7
No	50	26.3
Health professional consulted		
General practitioner	25	17.9
Orthopaedic doctor	40	28.6
Physiotherapist	71	50.7
Do not know	4	2.9
Type of treatment received		
Bed rest	2	1.4
Medication	53	37.9
Back support	13	9.3
Exercises	29	20.7
Electrotherapy	37	28.4
Massage	6	4.3

**Table 4:** Associations between the prevalence of LBP, socio-demographic characteristics and job factors.

Socio-demographic characteristics	12 months prevalence of Low-back pain		$\chi^2$	<i>P</i>
	Yes	No		
Age				
30-39	44 (74.6)	15 (25.4)	3.298	0.192
40-49	97 (77.6)	28 (22.4)		
50+	49 (87.5)	7 (12.5)		
Marital status				
Not married	34 (81.0)	8 (19.0)	0.098	0.754
Married	156 (78.8)	42 (21.2)		
Level of education				
Primary and Below	32 (91.4)	3 (8.6)	6.121	0.047
Secondary	118 (74.7)	40 (25.3)		
Tertiary	40 (85.1)	7 (14.9)		
Type of automobile engaged in				
Small cars	92 (77.3)	27 (22.7)	0.493	0.483
Big cars	98 (81.0)	23 (19.0)		
Frequent bending				

Yes	190 (79.2)	50 (20.8)	_____	_____
No	0 (0.0)	0 (0.0)		
Lifting 5 kg				
Yes	152 (81.7)	34 (18.3)	3.269	0.071
No	38 (70.4)	16 (29.6)		
Lifting 25 Kg				
Yes	82 (78.1)	23 (21.9)	0.130	0.719
No	108 (80.0)	27 (20.0)		
Sustained sitting				
Yes	105 (81.4)	24 (18.6)	0.840	0.359
No	85(76.6)	26 (23.4)		
Sustained standing				
Yes	126 (79.2)	33 (20.8)	0.002	0.966
No	64 (71.0)	17 (29.0)		

Statistically significance at  $P < 0.05$ .

**Table 5:** Logistic regression analysis predicting the likelihood of reporting low back pain.

Independent variable	B	SE	Exp (B) with 95% CI	P
Age				
30-39			1	
40-49	-0.09	0.38	0.92 (0.44 to 1.92)	0.82
50+	-0.81	0.51	0.45 (0.17 to 1.21)	0.11
Level of education				
Primary and Below	-0.63	0.74	0.53 (0.13 to 2.25)	0.39
Secondary	0.59	0.45	1.80 (0.74 to 4.37)	0.20
Tertiary			1	
Lifting 5 kg				
Yes			1	
No	0.56	0.36	1.75 (0.86 to 3.56)	0.12

Statistically significance at  $P < 0.05$ .

(8.9%). The mean pain intensity of participants in the past seven days was  $5.95 \pm 1.61$  cm (range 1-9 cm).

At the bivariate level, there was no significant association between prevalence of LBP and each of age ( $\chi^2 = 3.298$ ,  $P = 0.192$ ), marital status ( $\chi^2 = 0.098$ ,  $P = 0.754$ ), type of automobile repairs engaged in ( $\chi^2 = 0.493$ ,  $P = 0.483$ ), lifting objects up to 5 kg ( $\chi^2 = 3.269$ ,  $p = 0.071$ ), lifting objects up to 25 kg ( $\chi^2 = 0.130$ ,  $p = 0.719$ ), sustained sitting ( $\chi^2 = 0.840$ ,  $p = 0.349$ ), and sustained standing ( $\chi^2 = 0.002$ ,  $p = 0.996$ ). However, there was a significant association between level of education and the prevalence of LBP ( $\chi^2 = 6.121$ ,  $p = 0.047$ ) (Table 4).

Multivariate logistic regression did not show any significance between the prevalence of LBP, age and lifting objects up to 5 kg (Table 5).

## Discussion

The findings of this study revealed that work-related LBP is a significant health problem among automobile technicians. The LBP prevalence of 79.2% in the present

study was higher than 44.3% reported by Phillip, et al. [23] and 62.8% reported by Tamene, et al. [24] among automobile workers in Southern India and Southern Ethiopia, respectively. Conversely, the prevalence of LBP reported by the automobile in this study was lower than the 80.4% reported among their counterparts in Eastern Nigeria [1]. The varying results between the present study and the study by Abaraogu, et al. [1] may be as a result of the heterogeneity of their sample (comprising panel beating, wheel alignment, electrical works, repairs and servicing). It is adducible that the high physical strength demand of automobile mechanic duties predisposed them to high rates of LBP. Previous investigators have confirmed a significant association between increased physical demand and risk of LBP [4,25,26].

The high rate of absenteeism, defined as the absence of a worker from their work-place during a typical day's work schedule [27], found in this study is an indicator of heightened disability among automobile technicians. LBP is the largest contributor to absenteeism caused by musculoskeletal problems [28]. The prevalen-



ce rate of absenteeism in this study is higher than that of a previous study among automobile factory workers [29]. Abaraogu, et al. [1] also found that about half of automobile technicians who had LBP were prevented from doing their usual activities.

Automobile technicians with LBP in this study reported difficulty with climbing stairs, standing and lying down. LBP as a debilitating condition interferes with normal functioning and activities of daily living [30,31]. Previous studies have reported that individuals with LBP often have difficulties in climbing stairs and standing but find relief for their back pain while lying down [30,31]. The automobile technicians in this study found it challenging to maintain lying position, as some of their daily jobs require lying on their backs often, maintain such working positions during an active episode of LBP may be quite difficult.

The finding of this study shows that 40% and 35.8% of automobile technicians who developed LBP had incurred about N1000-N5000 and N5000-N10000, respectively as treatment cost. Also, having LBP led to loss of productivity of about N1000-N5000 and N5000-N10000 respectively by 35.5% and 38.7% of the automobile technicians. N1000-N5000 and N5000-N10000 translate to \$2.74-\$13.7 and \$13.7-\$27.4 respectively. Reflective on the study context where out-of-pocket payments for health care is the practice, especially among blue-collar workers, health care service for automobile technicians seems not affordable, as most Nigerians earn less than one dollar a day. It is adducible that consideration for the cost of treatment may have accounted for the 26.3% of automobile technicians who did not seek health professional to take care of LBP. Eme Ichoku and Leibbrandt [32] found that a formal and informal user fee, which vary according to the kind of treatment sought and the level of the facility utilised, is charged in health care facilities in Nigeria. Also, Mbada, et al. [33] found a willingness to pay rate of 41.7% for physiotherapy session among a population of Nigerians that earn between N15,000 and N50,000 monthly. The study highlights that within the range of earnings, willingness to pay the sum of N5,000 for LBP treatment translates to 10% and 33.3% spending from a high and low earner, respectively. It is reasonable that the burden of cost of care for every treatment based on the out-of-pocket spending may encourage alternative health care seeking among automobile technicians in this study.

Majority of the automobile technicians in this study sought the services of physiotherapists to manage their LBP. This finding is in contrast to the study by Abaraogu, et al. [1], where self-treated and over-the-counter drugs were commonly used to manage LBP among automobile technicians. It is possible that these individuals' health problem is of severity that is beyond coping and self-treated, thus making them seek health care. Otherwise, anecdotal evidence suggests that self-medi-

cation and use of alternative care for musculoskeletal pain is a common phenomenon in the setting where this study was conducted, especially among blue-collar workgroup. Also, patronage of physiotherapy by automobile technicians in this study may suggest increase awareness of the role of physiotherapy in pain management. Patronage of physiotherapy among these individuals may be cost-saving. Frogner, et al. [34] submit that an individual with LBP whose first contact health provider was a physiotherapist may likely have a lower opioid prescription; no advanced imaging investigation and lower out-of-pocket costs than those who never or later saw a physiotherapist. Another finding from this study indicates that neither socio-demographic characteristics nor work activities were associated with the prevalence of LBP. It is implied that physical exertion and other manual demands of the job predispose to LBP. In sum, a large number of automobile technicians experience work-related LBP. Therefore, it is pertinent that automobile associations, health policymakers and regulatory bodies consider ergonomic and safety education interventions that will address the hazardous effects of engaging in automobile mechanics job.

In view of apparent dearth of occupation-specific tool to assess musculoskeletal disorders among automobile technicians, the Bindra, et al. [21] questionnaire for low back pain in the garment industry workers was adapted in this study and was evaluated for face validity by experts. Though the Bindra, et al. [21] questionnaire had acceptable internal consistency and moderate to high test re-test reliability, lack of findings on its external validity to other occupational populations, such as automobile technicians is a significant limitation of this study. Furthermore, information on anthropometric characteristics involving body mass index, lifestyle habits (e.g. smoking) and health conditions (e.g. diabetes mellitus), and other work characteristics such as duration of hours of work in a week and month which could have strong association with LBP prevalence and influence the result were not obtained in this study. Therefore, future studies are needed to explore these limitations and validate the findings of this study.

## Conclusion

There is a high prevalence of LBP among Nigerian automobile technicians, and it results in work absenteeism, economic burden and increased need to seek health care. While automobile specific activities requiring frequent bending, lifting heavy objects and sustained postures in sitting or standing did not significantly influence prevalence of LBP, education as a socio-demographic factor was significantly associated with LBP prevalence among them. However, the saliency of the association between level of education and the prevalence of LBP is in fact based on the multiple testing of each factor and prevalence of LBP, but may not survive in the multiple corrections.

## Acknowledgement

We appreciate all the automobile technicians who took part in this study.

## Declarations

### Conflicts of interest/Competing interests

The authors declare no conflicts of interest/competing interests.

### Availability of data and material

The data and materials used for this research are available on request.

### Code availability

Not applicable.

### Ethics approval

Approval was obtained from the Health Research and Ethics Committee (IPHOAU/12/723) of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife, Nigeria. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

### Consent to participate

Informed consent was obtained from all individual participants included in the study.

### Consent for publication

Patients signed informed consent regarding publishing their data and photographs.

### Authors' contributions

[Concept development: O.A.O, M.C.E, F.F; Design (planned the methods to generate the results): O.A.O, M.C.E, I.O.A, O.T; Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): O.A.O, M.C.E, F.F; Data collection/processing (responsible for experiments, organization, or reporting data): M.H, S.A, I.O.A, O.T; Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): O.A.O, M.C.E, O.T, M/H, I.O.A, F.F; Literature search (performed the literature search): O.T, O.A.O; Writing (responsible for writing a substantive part of the manuscript): O.A.O, M.C.E, O.T, M.H, I.O.A; Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): O.A.O, F.F, M.C.E, S.A, I.O.A; Approval of final draft: O.A.O, M.B.E, O.T, M.H, I.O.A, S.A, F.F].

### Funding

The research was self-funded by authors.

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