# Prevalence and pattern of work-related musculoskeletal disorders among Nigerian bricklayers

Adesoji R Adedoyin[a], Chidozie E Mbada[a], Oladotun K Ajayi[a], Opeyemi A Idowu[b,*], Saturday N Oghumu[c], Kayode I Oke[b], Haruna M Moda[d] and Francis Fatoye[e]

[a]*Department of Medical Rehabilitation, Obafemi Awolowo University, Ile-Ife, Nigeria*
[b]*Department of Physiotherapy, School of Basic Medical Sciences, College of Medical Sciences, University of Benin, Benin City, Nigeria*

[c]*Department of Physiotherapy, University of Benin Teaching Hospital, Benin City, Nigeria*
[d]*Occupational Safety Health and Environment, Department of Health Professions, Manchester Metropolitan University, Manchester, UK*

[e]*Department of Health Professions, Faculty of Health, Psychology and Social Care, Manchester Metropolitan University, Manchester,* UK

**Abstract**.
**BACKGROUND:** Typically, bricklayers in developing countries' contexts manually lay bricks, concrete blocks and other similar materials to construct walls and buildings which make them susceptible to work-related musculoskeletal disorders (WRMSDs). The burden of WRMSDs among this high-risk group seems has not been well documented.
**OBJECTIVE:** This study examined the prevalence of WRMSDs among bricklayers in Nigeria.
**METHODS:** A cross-sectional survey of 118 consenting bricklayers from a Nigerian setting was carried out. The standardized Nordic musculoskeletal disorder questionnaire and a proforma were used to profile the prevalence of WRMSDs and socio-demographic information of the respondents. Data was analyzed using descriptive and inferential statistics. Alpha level was set at $p < 0.05$.
**RESULTS:** The 12-months and 7-days prevalence of WRMSDs were 87.3% and 67.4%. Shoulder (61.0%) and the low-back (59.3%) were the two most affected anatomical sites based on 12-month prevalence. WRMSDs affecting the knees (6.8%) was the most disabling in carrying normal work routines. Working for less than 10 years was significantly associated with high prevalence of WRMSDs in the shoulder (odd ratio (OR) = 0.27, 95% confidence interval (CI) = 0.09 to 0.87) and wrist region (OR = 0.24, 95%CI 0.08 to 0.73). Having neck pain led to higher odds (OR = 0.29, 95%CI 0.13 to 0.68) of taking a break from work among the bricklayers.
**CONCLUSION:** WRMSDs were high among Nigerian bricklayers. Years of work experience was associated with high prevalence of WRMSDs in the shoulder and wrist. In addition, taking work breaks was associated with neck pain.

Keywords: Bricklayers, musculoskeletal trouble, 12 months prevalence

## 1. Introduction

Musculoskeletal disorders (MSDs), which is defined as health problems of the locomotor apparatus, including any type of complaint ranging from slight transient discomfort to irreversible and debilitating injuries [1], are significant health problems throughout the world [2]. Typically, MSDs are categorized as disorders that affect the musculoskeletal system especially bones, spinal discs, tendons, joints, ligaments, cartilage, nerves and blood vessels with resultant injuries such as sprains, strains, tears, soreness, pain, carpal tunnel syndrome, hernias, and connective tissue injuries [2, 3]. According to the World Health Organization (WHO), MSDs are the second largest contributor to the global disability, with low-back pain being the single leading cause of disability [1].

Epidemiological evidence and biological plausibility abound on work-relatedness of MSDs [2] and symptoms associated with workplaces where there exists discrepancy between physical capacity of the human body and physical demand associated with the task [3]. Hence, work related musculoskeletal disorders (WRMSDs) refer to the MSDs that result from a work-related event [4, 5]. WRMSDs are a major cause of restricted work time, loss of earning, increased healthcare costs and as such place and undue economic burden on workers, their families and employers [6]. The etiology and pathogenesis of WRMSDs are complex and results from the combinations and interactions between the associated risk factors [7]. Furthermore, the presence and effect of these risk factors are more pronounced in some occupation and occupational environments than others thereby increasing the vulnerability of workers in these occupation [8].

WRMSDs is well-documented among various professions such as professional drivers [9], nurses and hospital workers [10, 11], school teachers [12], construction workers [13] and sonographers [14]. There are peculiarities among reports of the prevalence and pattern of WRMSDs in different occupation and industries as they differ in working procedures, environment, and policies. The construction and building trade pose many severe and costly health risks, including MSDs [15]. Workers in the construction trade, especially bricklayers who are involved with blockwork and other masonry works are prone to the risks of WRMSDs [16]. Hence, artisans [17]. In a previous study from Nigeria, 97% prevalence of MSDs was reported among Nigerian bricklayers [18]. Further, another study found the prevalence of back pain, upper extremities, and lower extremities pain in construction workers to be 30.7%, 61.3%, and 49.2%, respectively [19]. Also, a study among construction workers in the United States of America revealed that the back region was the most affected body part by WRMSDs [13]. These studies indicate that construction workers, especially those involved in bricklaying are among the most susceptible to hazard and the development of WRMSDs among other high-risk industries [20].

Prolonged and awkward work postures and manual handling of materials are associated with WRMSDs among bricklayers [13, 21]. Studies have shown that lower back complaints among bricklayers might be related to lifting and carrying, kneeling or prolonged standing [22–25]. These complaints affect the workers' ability, making them less willing to stay in their jobs for a long time, thereby leading to early retirement [24]. Boschman et al. [25] emphasized on the importance of proactive monitoring of work-related musculoskeletal complaints, selection of potentially effective intervention measures and workable preventive approach among bricklayers from further physical deterioration due to WRMDS as strategy to prolong their trade, as well as reduce cost associated with recruitment and training of new workers to replace those that left early as a result of MSDs. Protecting this category of workers from undue WRMSDs can only be achieved where there are proper and adequate empirical studies on WRMSDs among them. To our knowledge, only one study on WRMDs among bricklayers in Nigeria seem to exist, and it was a retrospective study conducted more than three decades ago. Thus, there is need for an empirical update of WRMDs among this occupational group. Bricklayers in Nigeria's contexts typically are involved in manual laying of bricks, concrete blocks, and other similar materials to construct walls and buildings, and as such are prone to WRMSDs. The burden of WRMSDs among this high-risk group seems have received less attention in research, despite its implications in policy and practice. Hence, this study aimed to assess the prevalence of WRMSDs among Nigerian bricklayers.

## 2. Materials and methods

This study was a cross-sectional survey of 118 consenting bricklayers in Ile-Ife, Osun State, south-west Nigeria. Ile-Ife also called Ife, is an ancient town that

is often regarded as cradle of the Yoruba race, having a population of over 501,952 persons. Being a commercial city, Ile-Ife is house to a wide range of workers, including masons. Masonry in the Ile-Ife is regulated by the Association of Bricklayers (cement masons). Registered members of the association were invited to participate in the study during one of their quarterly meetings.

The Standardized Nordic Questionnaire was used to elicit information on WRMSDs from respondents. The Nordic Musculoskeletal Questionnaire comprises an anatomical diagram highlighting nine major areas of the body (neck, shoulders, upper-back, elbows, wrists/hands, low back, hips/thighs, knees and ankles/feet) [26]. Respondents were instructed to note regions where they have felt any ache, discomfort or pain in the last 12 months and 7days. Thereafter, using the knowledge of the body areas, respondents were asked to answer 11 questions that followed. Two of the questions inquired whether respondents ever had any ache, discomfort or pain on any of the highlighted body parts in the last 12 months and 7 days. Nine questions specifically inquired whether respondents had troubles on each of the body parts in the last 12 months. Respondents were also asked whether or not such ache, discomfort or pain in the last 12 months prevented them from doing their normal work. Further, socio-demographic information including (age, sex, marital status, educational level and years of practice) and work settings (hours of work per day, work breaks) were obtained from respondents using a proforma. The standard Nordic questionnaire and other information obtained are presented in the Appendix. In addition to this, the pattern of work of respondents were anecdotally observed.

Ethical approval was obtained from the Health Research and Ethics Committee of the Institute of Public Health (IPH), Obafemi Awolowo University, Ile-Ife, Nigeria. Administrative approval to conduct this study was obtained from the chairperson of the Association of bricklayers, Ile-Ife. Individual informed consents were obtained from the bricklayers after the purpose of the study was explained to them. Eligible respondents were those who were 18 years and older, and who were predominantly involved in bricklaying as a full-time occupation. Those who had a positive history of infection or systemic disease, as well as those with less than three months of work experience were excluded from the study. A sample size of 125 was estimated based on the total sample size of registered members of the Association of Bricklayers using the recommendations of Browner and colleagues where correlation coefficient (r) is 0.30, alpha ($\alpha$) is 0.01 and beta ($\beta$) is 0.20 [27]. A total of 121 questionnaires were returned and collected the same day, thus yielding a response rate of 96.8%. However, data for the only three females who participated in the study were excluded due to the fewness. 118 questionnaires representing that of all male bricklayers was analyzed.

## 3. Data analysis

Descriptive statistics of median, interquartile range, and percentages were used to summarize the data. Inferential statistics of Chi-square was used to determine the association between WRMSDs and each of age, marital status, length of work experience, and work breaks. Logistic regression was used to determine the association between the significant respondents' characteristics in the bivariate analysis according to the corresponding body part. For the purpose of regression analysis, marital status was classified into single, married and divorced/widowed. Level of significance was set at $p < 0.05$.IBM SPSS Statistics for Windows, Version 20.0.

## 4. Results

The majority of respondents (68.3%) were within the age range of 18–35 years. Their median age, years of practice and accumulated work hours were 28.5 years (Interquartile Range [IQR)] = 12.0), 7 (IQR = 13) years and 8 (IQR = 1) hours, respectively. 66.97% of the respondents had working experience of 1–15 years. Socio-demographic and occupational characteristics of respondents is presented in Table 1.

One hundred and three (87.3%) respondents reported WRMSDs in any part of the body in the last 12 months. The 7 days prevalence rate of WRMSDs was 67.4%. The 12 months prevalence rate of WRMSDs was highest in the shoulder (61.0%), followed by the low back (59.3%), and the neck (55.1%) (Fig. 1). WRMSDs of the knees (6.8%), hips (5.8%) and low back (5.8%) prevented respondents most from doing their normal job in the last 12 months (Fig. 1). Out of the 103 respondents that reported WRMSDs in any region of the body in the last 12 months, 38.8% took breaks away from work as a result of WRMSDs.

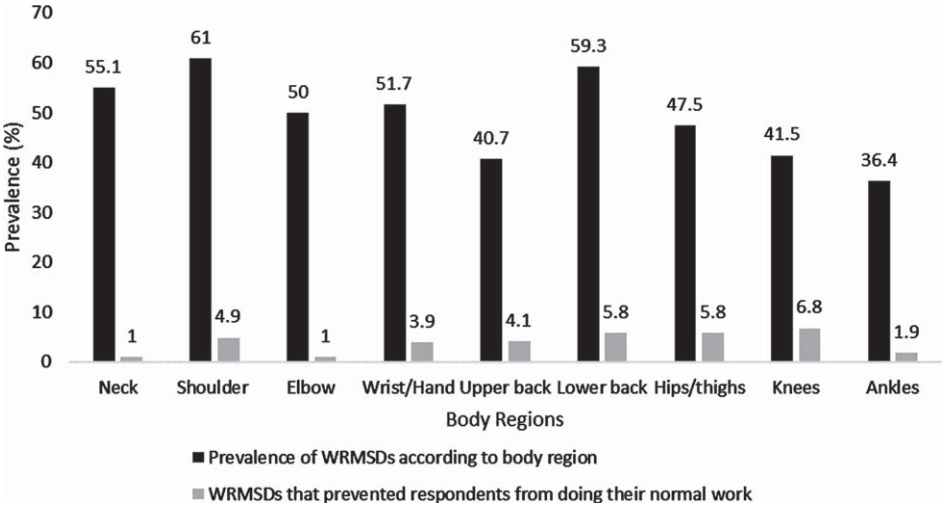


Fig. 1. Prevalence of WRMSDs according to body regions in the last 12 months. **Key.** WRMSDs: Work-related musculoskeletal disorders.

Table 1
Socio-demographic and occupational characteristics of respondents

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Sex | | |
| Male | 118 | 100.0 |
| Age (years) | | |
| < 20 | 4 | 3.4 |
| 20–29 | 56 | 47.4 |
| 30–39 | 35 | 29.7 |
| 40–49 | 15 | 12.7 |
| 50 and above | 8 | 6.8 |
| Educational background | | |
| SSCE | 83 | 70.3 |
| OND/HND | 8 | 6.8 |
| B.Sc. | 1 | 0.9 |
| Others | 26 | 22 |
| Marital status | | |
| Single | 53 | 44.9 |
| Married | 56 | 47.5 |
| Divorced | 3 | 2.5 |
| Widow/Widower | 6 | 5.1 |
| Length of work experience | | |
| < 5 years | 45 | 38.1 |
| 6–10 years | 29 | 24.6 |
| 11–15 years | 12 | 10.2 |
| 16–20 years | 12 | 10.2 |
| > 20 years | 20 | 16.9 |
| Hours at work per day | | |
| ≤ 6 hours | 7 | 5.9 |
| 7–9 hours | 108 | 91.6 |
| ≥ 10 hours | 3 | 2.5 |

The median number of days of work breaks was 12 (IQR = 26.5) days. In the bivariate analysis, (Table 2a-c) the prevalence of neck pain in the last 12 months was associated with age ($\chi^2 = 13.75$, $p = 0.005$), year of practice ($\chi^2 = 13.77$, $p = 0.007$), marital status ($\chi^2 = 13.98$, $p = 0.001$) and work breaks ($\chi^2 = 10.03$, $p = 0.001$). Further, there was a significant association between prevalence of low-back pain and age ($\chi^2 = 11.2$, $p = 0.018$), as well as between the prevalence of ankle pain and marital status ($\chi^2 = 14.31$, $p = 0.001$). There was no significant association between prevalence of knee pain and any of the respondents' characteristics ($p > 0.05$). Logistic regression was fitted to determine the influence of respondents' characteristics and anatomical sites on the prevalence of WRMSDs. Table 3 show that having worked for less than 10 years was significantly associated with high prevalence of WRMSDs in the shoulder (odd ratio (OR) = 0.27, 95% confidence interval (CI) = 0.09 to 0.87) and wrist regions (OR = 0.24, 95%CI 0.08 to 0.73) while taking break from work as a result of WRMSD (OR = 0.29, 95%CI 0.13 to 0.68) increased the odds of having neck pain.

## 5. Discussion

This study assessed the prevalence of WRMSDs among bricklayers. From the demographic results, a majority of the bricklayers were young adults. Bricklaying in the Nigeria's context is a tedious and tasking work that can only be done by younger people, which may have accounted for the fewer number of older adults in this study. Bricklayers from this contextual setting as anecdotally observed do not have a specific work routine or pattern. They work daily mostly from Monday to Saturday and occasionally on Sundays as

Table 2a
The association between the prevalence of musculoskeletal pain (12 months) by body part (neck, shoulder and elbow) and participants' characteristics

| | Neck | | | Shoulder | | | Elbow | | |
|---|---|---|---|---|---|---|---|---|---|
| | N (%) | $\chi^2$ | *P* | N (%) | $\chi^2$ | *P* | N (%) | $\chi^2$ | *P* |
| Age | | | | | | | | | |
| < 20 | 3 (75.0) | 13.75 | 0.005* | 3 (75.0) | 10.91 | 0.02* | 3 (75.0) | 12.76 | 0.009* |
| 20–29 | 39 (69.6) | | | 39 (69.6) | | | 33 (58.9) | | |
| 30–39 | 16 (45.7) | | | 22 (62.9) | | | 19 (54.3) | | |
| 40–49 | 6 (4.0) | | | 7 (46.7) | | | 3 (2.0) | | |
| 50 and above | 1 (12.5) | | | 1 (12.5) | | | 1 (12.5) | | |
| Educational qualification | | | | | | | | | |
| SSCE | 49 (59.0) | 4.32 | 0.195 | 56 (67.5) | 6.70 | 0.058 | 45 (54.2) | 2.95 | 0.442 |
| OND/HND | 5 (62.5) | | | 5 (62.5) | | | 4 (5.0) | | |
| B.Sc. | 1 (10.0) | | | 0 (.0) | | | 0 (.0) | | |
| Others | 10 (38.5) | | | 11 (42.3) | | | 10 (38.5) | | |
| Year of practice | | | | | | | | | |
| <= 5 | 31 (68.9) | 13.77 | 0.007* | 31 (68.9) | 13.77 | 0.007* | 26 (57.8) | 14.25 | 0.006* |
| 6–10 | 15 (51.7) | | | 22 (75.9) | | | 18 (62.1) | | |
| 11–15 | 7 (58.3) | | | 8 (66.7) | | | 8 (66.7) | | |
| 16–20 | 5 (41.7) | | | 3 (25.0) | | | 3 (25.0) | | |
| > 20 | 7 (35.0) | | | 8 (4.0) | | | 4 (2.0) | | |
| Marital status | | | | | | | | | |
| Single | 38 (71.7) | 13.98 | 0.001* | 36 (67.9) | 10.02 | 0.009* | 29 (54.7) | 8.12 | 0.03* |
| Married | 23 (41.1) | | | 27 (48.2) | | | 22 (39.3) | | |
| Divorced | 0 (.0) | | | 3 (10.0) | | | 3 (10.0) | | |
| Widowed | 4 (66.7) | | | 6 (10.0) | | | 5 (83.3) | | |
| Break from work | | | | | | | | | |
| Yes | 36 (72.0) | 10.03 | 0.001* | 32 (64.0) | 0.325 | 0.353 | 26 (52.0) | 0.14 | 0.709 |
| No | 29 (42.6) | | | 40 (58.8) | | | 33 (48.5) | | |

Table 2b
The association between the prevalence of musculoskeletal pain (12 months) by body part (wrist/hand, upper back and lower back) and participants' characteristics

| | Wrist/hand | | | Upper back | | | Lower back | | |
|---|---|---|---|---|---|---|---|---|---|
| | N (%) | $\chi^2$ | *P* | N (%) | $\chi^2$ | *p* | N (%) | $\chi^2$ | *P* |
| Age | | | | | | | | | |
| < 20 | 3 (75.0) | 19.36 | 0.001* | 2 (5.0) | 11.48 | 0.015* | 3 (75.0) | 11.2 | 0.018* |
| 20–29 | 37 (66.1) | | | 30 (53.6) | | | 37 (66.1) | | |
| 30–39 | 18 (51.4) | | | 13 (37.1) | | | 23 (65.7) | | |
| 40–49 | 2 (13.3) | | | 2 (13.3) | | | 6 (4.0) | | |
| 50 and above | 1 (12.5) | | | 1 (12.5) | | | 1 (12.5) | | |
| Educational qualification | | | | | | | | | |
| SSCE | 47 (56.6) | 3.68 | 0.238 | 35 (42.2) | 2.23 | 0.58 | 54 (65.1) | 5.18 | 0.119 |
| OND/HND | 4 (5.0) | | | 2 (25.0) | | | 3 (37.5) | | |
| B. Sc. | 0 (.0) | | | 1 (10.0) | | | 1 (10.0) | | |
| Others | 10 (38.5) | | | 10 (38.5) | | | 12 (46.2) | | |
| Year of practice | | | | | | | | | |
| <= 5 | 30 (66.7) | 20.29 | 0.001* | 23 (51.1) | 9.59 | 0.045* | 29 (64.4) | 5.19 | 0.266 |
| 6–10 | 19 (65.5) | | | 14 (48.3) | | | 18 (62.1) | | |
| 11–15 | 6 (5.0) | | | 5 (41.7) | | | 9 (75.0) | | |
| 16–20 | 2 (16.7) | | | 3(25.0) | | | 6(5.0) | | |
| > 20 | 4 (2.0) | | | 3 (15.0) | | | 8 (4.0) | | |
| Marital status | | | | | | | | | |
| Single | 32 (6.0)4 | 10.71 | 0.006* | 25 (47.2) | 13.60 | 0.001* | 35 (66.0) | 10.44 | 0.008* |
| Married | 21 (37.5) | | | 15 (26.8) | | | 26 (46.4) | | |
| Divorced | 3 (10.0) | | | 3 (10.0) | | | 3 (10.0) | | |
| Widowed | 5 (83.3) | | | 5 (83.3) | | | 6 (10.0) | | |
| Break from work | | | | | | | | | |
| Yes | 24 (48.0) | 0.47 | 0.49 | 19 (38.0) | 0.26 | 0.612 | 32 (64.0) | 0.79 | 0.375 |
| No | 37 (54.4) | | | 29 (42.6) | | | 38 (55.9) | | |

Table 2c
The association between the prevalence of musculoskeletal pain (12 months) by body part (hip, knee and ankle) and participants' characteristics

| | Hip | | | Knee | | | Ankle | | |
|---|---|---|---|---|---|---|---|---|---|
| | N (%) | $\chi^2$ | *p* | N (%) | $\chi^2$ | *P* | N (%) | $\chi^2$ | *P* |
| Age | | | | | | | | | |
| < 20 | 3 (75.0) | 8.92 | 0.053 | 3 (75.0) | 5.09 | 0.269 | 3 (75.0) | 5.02 | 0.269 |
| 20–29 | 31 (55.4) | | | 24 (42.9) | | | 23 (41.1) | | |
| 30–39 | 17 (48.6) | | | 16 (45.7) | | | 11 (31.4) | | |
| 40–49 | 4 (26.7) | | | 5 (33.3) | | | 3 (2.0) | | |
| 50 and above | 1 (12.5) | | | 1 (12.5) | | | 3 (37.5) | | |
| Educational qualification | | | | | | | | | |
| SSCE | 43 (51.8) | 3.26 | 0.324 | 37 (44.6) | 2.49 | 0.487 | 32 (38.6) | 2.49 | 0.526 |
| OND/HND | 2 (25.0) | | | 4 (5.0) | | | 2 (25.0) | | |
| B.Sc. | 0 (0.0) | | | 0 (0.0) | | | 1 (10.0) | | |
| Others | 11 (42.3) | | | 8 (3.0)8 | | | 8 (3.0)8 | | |
| Year of practice | | | | | | | | | |
| <= 5 | 24 (53.3) | 9.71 | 0.043* | 19 (42.2) | 6.64 | 0.153 | 18 (4.0) | 6.59 | 0.154 |
| 6–10 | 17 (58.6) | | | 16 (55.2) | | | 14 (48.3) | | |
| 11–15 | 7 (58.3) | | | 6 (5.0) | | | 4 (33.3) | | |
| 16–20 | 4 (33.3) | | | 2 (16.7) | | | 1 (8.3) | | |
| > 20 | 4 (2.0) | | | 6 (3.0) | | | 6 (3.0) | | |
| Marital status | | | | | | | | | |
| Single | 33 (62.3) | 11.12 | 0.005* | 23 (43.4) | 5.69 | 0.059 | 24 (45.3) | 14.31 | 0.001* |
| Married | 18 (32.1) | | | 19 (33.9) | | | 12 (21.4) | | |
| Divorced | 1 (33.3) | | | 3 (10.0) | | | 3 (10.0) | | |
| Widowed | 4 (66.7) | | | 4 (66.7) | | | 4 (66.7) | | |
| Break from work | | | | | | | | | |
| Yes | 29 (58.0) | 3.88 | 0.049* | 22 (44.0) | 0.22 | 0.64 | 18 (36.0) | 0.01 | 0.932 |
| No | 27 (39.7) | | | 27 (39.7) | | | 25 (36.8) | | |

their work demands. Usually, they start working as early as 8 am each day and stop working when their task for the day is done. The stoppage time ranges from 4 to 6pm and is dependent on the volume of work at hand. The bricklayers usually take their first meal before the commencement of the day's work and would only eat subsequently after the day's job is done. As they are paid per day, bricklayers in this context would prefer to work through the day to earn their wage. Most of the bricklayers in this study work for more than 7-hours daily. These long hours of work are quite implicating because a causal relationship exists between intense or long-duration exposure to specific risk factors and MSDs [2]. The long hours of work observed in this study may be a risk factor for the high prevalence of WRMSDs among the population, which is also consistent with the report of Anwer et al. [28]. Further, the 12 months WRMSDs prevalence observed in the current study was higher than those reported in earlier studies from other contexts [13, 25], but lower than the prevalence of 97% that was reported in a previous study carried out in Nigeria's context [18].

WRMSDs are one of the most widespread occupational health conditions in the construction industry [28]. Reports from the developed world showed that they may account for as high as 60% of occupational health conditions [29]. It can therefore be deduced that the statistics from developing countries may be higher due to poor working conditions, lack of up to date ergonomically suitable equipment, and health and safety-related policies. As observed in the current study, WRMSDs in the last 12 months were highest in the shoulder and low back regions. Furthermore, WRMSDs were more prevalent in the upper extremities and the low back than the lower extremities among Nigerian bricklayers. These findings are consistent with previous studies that reported a higher prevalence of WRMSDs in the shoulder and low back regions [16, 30–33]. Several reasons have been adduced for the high prevalence of WRMSDs in the shoulders and low back regions. Reddy et al. [30] reported various risks factor for shoulder and back injuries in bricklayers, including block weights, lifting frequency, and heights from which block and mortar are lifted. Others include height at which the block is placed, applying and smoothing mortar using a trowel, distance of the workface from the mason, high expected production rates, the height of the mortar stand or pan, degree and frequency of

Table 3
Logistic regression table showing the association between the prevalence of musculoskeletal pain in each body part and participant's characteristics

| Variables | Neck OR (95% CI), *p*-value | Shoulder OR (95% CI), *p*-value | Elbow OR (95% CI), *p*-value | Wrist OR (95% CI), *p*-value | Upper back OR (95% CI), *p*-value | Lower back OR (95% CI), *p*-value | Hip OR (95% CI), *p*-value |
|---|---|---|---|---|---|---|---|
| Age | | | | | | | |
| < 30 years | Reference | Reference | Reference | Reference | Reference | Reference | Reference |
| > 30 years | 0.29 (0.07 to 1.17), 0.08 | 1.08 (0.27 to 4.39), 0.92 | 0.52 (0.14 to 1.99), 0.08 | 0.45 (0.11 to 1.84), 0.27 | 0.31 (0.08 to 1.21), 0.09 | 0.59 (0.20 to 1.70), 0.33 | 0.73 (0.30 to 1.79), 0.50 |
| YOP | | | | | | | |
| < 10 years | Reference | Reference | Reference | Reference | Reference | | Reference |
| > 10 years | 1.31 (0.41 to 4.2), 0.65 | 0.27 (0.09 to 0.87), 0.03* | 0.41 (0.14 to 1.24), 0.11 | 0.24 (0.08 to 0.73), 0.01* | 0.56 (0.18 to 1.76), 0.32 | | 0.74 (0.31 to 1.81), 0.51 |
| MS | | | | | | | |
| Single | Reference | Reference | Reference | Reference | Reference | Reference | Reference |
| Others | 0.67 (0.22 to 2.06), 0.48 | 1.09 (0.35 to 3.39), 0.89 | 1.78 (0.57 to 5.53), 0.32 | 1.95 (0.57 to 6.65), 0.29 | 1.9 (0.6 to 6.0), 0.28 | 0.88 (0.30 to 2.59), 0.82 | 0.76 (0.35 to 1.64), 0.48 |
| BFW | | | | | | | |
| Yes | Reference | | | | | | |
| No | 0.29 (0.13 to 0.68), 0.001* | | | | | | |

OR = Odds ratio; 95% CI = 95% Confidence interval; YOP = Year of practice; MS = Marital status. BFW = Break from work; *$p < 0.05$.

twisting involved, and forward bending motions averagely 1,000 per shift [30]. In addition, bricklayers are exposed to ergonomically poor working positions such as repeatedly working with the arms overhead (> 60°) and deep back flexion (> 60°) [34]. This pattern of WRMSDs in the body regions highlights areas of ergonomic concerns among bricklayers.

From this study a higher odd ratio for having shoulder pain and wrist pain among those who had worked for less than 10 years than those with over 10 years of work experience was observed. The lower rate of shoulder pain and wrist pain among bricklayers with over 10 years of work experience may be attributed to more experience of carrying out their duties such that they are less predisposed to WRMSDs. Another explanation, based on anecdotes is that experience and older bricklayers in the study setting, do less of lifting and carrying of blocks and other materials but are more block setting and plastering that is often associated with seniority in the occupation. It is also possible that experienced and older bricklayers have increased level of knowledge about how to avoid harmful physical load. Lastly, the higher rates of shoulder pain and wrist pain among bricklayers with lesser years of work experience may be associated with the concept of 'healthy worker survivor effect'. The concept describes a continuing selection process where those who remain in an employment tend to be healthier over time. Though, by a mechanism that is still poorly understood, it is postulated that workers with longer years of experience tend to generally have reduced adverse effect to exposures that may cause WRMSDs [35], as well as, weak relations between symptomatic disorders and their physically demanding job [36].

It was observed from this study that there was a higher relative risk to take break from work among bricklayers who suffered neck pain than those who did not. WRMSDs are often reported to be a main cause of productivity loss at work and work absenteeism [28]. Taking work breaks among bricklayers in this study may suggest that WRMSDs led to serious health challenge that is beyond their coping ability, as bricklayers from this context rarely have any benefit of compensation for sustaining work hazard. Therefore, the chances of presenteeism are more than absenteeism. Accordingly, due to economic reasons, these bricklayers are compelled to report at work as they are often daily paid workers and missing a day's work may imply losing that day's wages.

To our knowledge, this is the first Nigerian study to assess WRMSDs among bricklayers prospectively

as the previous study by Akinmayowa [18] which was documented about 34 years ago was carried out retrospectively. This current study was focused on the association between non-modifiable risks factors for WRMSDs. However, the potential limitations of this study include that emphasis were not put on non-modifiable risk factors for WRMSDs and information on economic and nutritional status which may influence the WRMSDs in this population. In addition, owing to the cross-sectional nature of this study, typical work postures assumed by the bricklayers while at work was not assessed. Like all other cross-sectional studies, it may not be unlikely that some of the respondents might have given imprecise answers or inflated their WRMSDs owing to recall bias and regardless of whether they were caused by work or not.

## 6. Conclusion

WRMSDs, especially those affecting the shoulder and back regions in the extremities, are highly prevalent of among Nigerian bricklayers. The relative risk for having shoulder pain and wrist pain was higher among bricklayers who had worked for less than 10 years than those with more years of work experience. Having neck pain led to higher odds of taking a break from work among the bricklayers.

Healthcare providers and policy makers are to be aware of the findings of this study and focus on preventive educational programmes that will promote good work hygiene and ergonomic practice among bricklayers. The findings of this study invite the call for policy makers to ensure that ergonomically suitable equipment used and protective measures are in place to reduce the prevalence of WRMSDs and their associated burden among bricklayers in Nigeria. Future studies should other factors that could influence WRMSDs (for instance posture, economical and nutritional status) in this population.

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## Conflict of interest

The authors declare no competing interests.

## Supplementary materials

The appendix is available from https://dx.doi.org/10.3233/WOR-205240.

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