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PREVALENCE AND FACTORS ASSOCIATED WITH LOW BACK PAIN AMONG PRIMARY SCHOOL TEACHERS IN RWAMAGANA DISTRICT

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Abstract: **Low back pain (LBP) is the leading global cause of years lived with disability and represents a major public health and socio-economic concern. School teachers are an occupational group at high risk of LBP due to prolonged standing, heavy workload, poor ergonomic conditions, and psychosocial stress. Despite this burden, evidence on the prevalence and associated factors of LBP among primary school teachers in Rwanda remains limited. This study assessed the prevalence of low back pain and its associated socio-demographic and work-related factors among primary school teachers in Rwamagana District, Rwanda. A descriptive cross-sectional study using a quantitative approach was conducted in June 2025. A total of 169 primary school teachers were selected using a cluster sampling technique. Data was collected using a self-administered structured questionnaire. Descriptive statistics summarized participants' characteristics, while the Chi-square test assessed associations. Binary and multivariable logistic regression analyses were performed to identify independent predictors of low back pain. Statistical significance was set at $p < 0.05$. In multivariable analysis, teachers aged 41 years and above (AOR = 2.31; 95% CI: 1.12–4.76), female teachers (AOR = 1.98; 95% CI: 1.01–3.89), and married teachers (AOR = 2.67; 95% CI: 1.24–5.74) were more likely to experience low back pain. Prolonged standing for six hours or more per day (AOR = 3.21; 95% CI: 1.02–10.09), teaching six or more classes per day (AOR = 2.12; 95% CI: 1.02–4.41), use of chairs without lumbar support (AOR = 3.84; 95% CI: 1.76–8.37), high workplace stress (AOR = 4.98; 95% CI: 1.94–12.76), job dissatisfaction (AOR = 2.96; 95% CI: 1.01–8.65), and poor social support (AOR = 3.87; 95% CI: 1.08–13.88) remained independent predictors of low back pain. Low back pain is highly prevalent among primary school teachers in Rwamagana District and is strongly influenced by demographic, occupational, ergonomic, and psychosocial factors. Targeted ergonomic interventions, workload reduction, stress management programs, and occupational health education are recommended to reduce the burden of low back pain among primary school teachers.**

Keywords: **Low Back Pain (LBP), Prevalence, Associated Factors, Primary School Teachers, Occupational Health.**

I. INTRODUCTION

Introduction

Low back pain (LBP) is one of the most prevalent musculoskeletal disorders worldwide and remains the leading cause of years lived with disability (YLDs), affecting the health, well-being, and productivity of millions of people globally (Fatoye et al., 2019). According to recent estimates, more than 619 million people were living with LBP in 2020, and this figure is projected to increase to approximately 843 million by 2050 due to population growth and population ageing (Ferreira et al., 2023). Although age-standardized prevalence rates have shown a slight decline over the past three decades, the absolute

burden of LBP continues to rise, posing substantial challenges to health systems, workplaces, and economies worldwide. Globally, LBP accounted for approximately 223.5 million cases and 63.7 million disability-adjusted life years (DALYs), highlighting its considerable public health significance (Wang et al., 2022).

The burden of LBP is particularly pronounced among working populations because of its impact on physical functioning, productivity, absenteeism, and quality of life. The World Health Organization has identified low back pain as one of the major work-related health conditions requiring continuous surveillance and preventive interventions (Lozano et al., 2012). Evidence indicates that between 1990 and 2015, the number of years lived with disability attributable to LBP increased by approximately 54%, with the greatest increases occurring in low- and middle-income countries where healthcare resources are often limited (Vos et al., 2016). Consequently, LBP has emerged as a significant socioeconomic burden, especially in developing countries where occupational health services are less developed and competing health priorities consume much of the available resources.

In Africa, the prevalence of LBP remains alarmingly high. Studies have reported a pooled lifetime prevalence of approximately 47%, annual prevalence of 57%, and point prevalence of 39%, figures that are comparable to or even higher than global estimates (Morris et al., 2018). Similarly, Louw et al. (2007) reported average lifetime prevalence rates of 36% among adolescents and 62% among adults in Africa. These findings demonstrate that LBP is a widespread health concern across the continent and contributes substantially to disability and reduced work performance.

Among occupational groups, teachers are particularly vulnerable to low back pain due to the nature of their daily activities. Teaching often involves prolonged standing while delivering lessons, extended periods of sitting during lesson preparation and marking, repetitive bending, lifting educational materials, and maintaining awkward postures in overcrowded classrooms. In addition, psychosocial factors such as workplace stress, high workloads, and job dissatisfaction may further increase the risk of developing musculoskeletal disorders (Elias et al., 2019). Consequently, teachers have consistently been identified as a high-risk occupational group for LBP in both developed and developing countries.

Several studies conducted internationally have reported high prevalence rates of low back pain among schoolteachers. In Bangladesh, LBP prevalence among schoolteachers was found to be considerably high (Akter et al., 2018). In Ethiopia, prevalence estimates ranged from 44% among primary school teachers in Addis Ababa to 74.5% among schoolteachers in other regions, with female teachers being more likely to experience LBP than their male counterparts (Abebaw, 2018; Balakrishnan et al., 2016). Similarly, a study conducted in Gondar Town, Ethiopia reported a prevalence of 57.5% (Beyen et al., 2013), while research in Kenya documented a prevalence of 64.98% among teachers (Elias et al., 2019). These findings underscore the magnitude of the problem among teachers and highlight the need for occupation-specific preventive strategies.

In Rwanda, studies conducted among different occupational groups have also revealed a considerable burden of low back pain. Previous research reported prevalence rates of 78% among nurses, 45.8% among bank workers, and 66.1% among school-aged children (Kanyenyeri et al., 2017; Lela & Frantz, 2012; Ndahimana & Frantz, 2011). Furthermore, spinal degenerative diseases accounted for a substantial proportion of low back pain cases managed in healthcare settings, with many patients' experiencing severe disability requiring surgical intervention (Nshuti et al., 2020). Despite this evidence, there remains limited information regarding the prevalence and determinants of low back pain among primary school teachers in Rwanda.

Teachers constitute a critical workforce for national development because they play a central role in shaping human capital and educational outcomes. Poor health among teachers may adversely affect instructional effectiveness, classroom attendance, learner performance, and overall educational quality. Therefore, understanding the magnitude and determinants of LBP among teachers is essential for developing targeted occupational health interventions that promote teacher well-being and enhance educational productivity.

Despite the growing burden of low back pain and the occupational risks faced by teachers, no comprehensive study had previously assessed the prevalence and associated factors of LBP among primary school teachers in Rwamagana District, Rwanda. This knowledge gap limited the availability of evidence required for the development of context-specific prevention and management strategies. Therefore, this study sought to assess the prevalence of low back pain and identify the associated socio-demographic and work-related factors among primary school teachers in Rwamagana District. Specifically, the study aimed to determine the prevalence of low back pain among primary school teachers and identify

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factors associated with its occurrence. The findings are expected to provide evidence for policymakers, educational authorities, and healthcare professionals to design effective occupational health interventions aimed at reducing the burden of low back pain among teachers in Rwanda.

II. THEORETICAL FRAMEWORK

Health Belief Model (HBM)

This study is guided by the Health Belief Model (HBM) to explain the factors influencing the prevention and management of low back pain (LBP) among primary school teachers. The HBM is a psychological health behavior theory that explains why individuals adopt or fail to adopt preventive health behaviors based on their perceptions and beliefs about a disease.

According to the Health Belief Model, individuals are more likely to engage in preventive actions when they perceive themselves to be susceptible to a health condition and believe that the condition is serious enough to affect their well-being and ability to work. In the context of low back pain, teachers who recognize their risk due to prolonged standing, poor posture, or workload demands are more likely to take preventive measures such as practicing proper ergonomics or seeking early treatment.

The model further emphasizes the importance of perceived benefits, where individuals are more likely to adopt preventive behaviors if they believe that such actions will reduce the risk or severity of LBP. However, these behaviors may be hindered by perceived barriers, such as lack of knowledge, limited access to healthcare services, or inadequate working conditions.

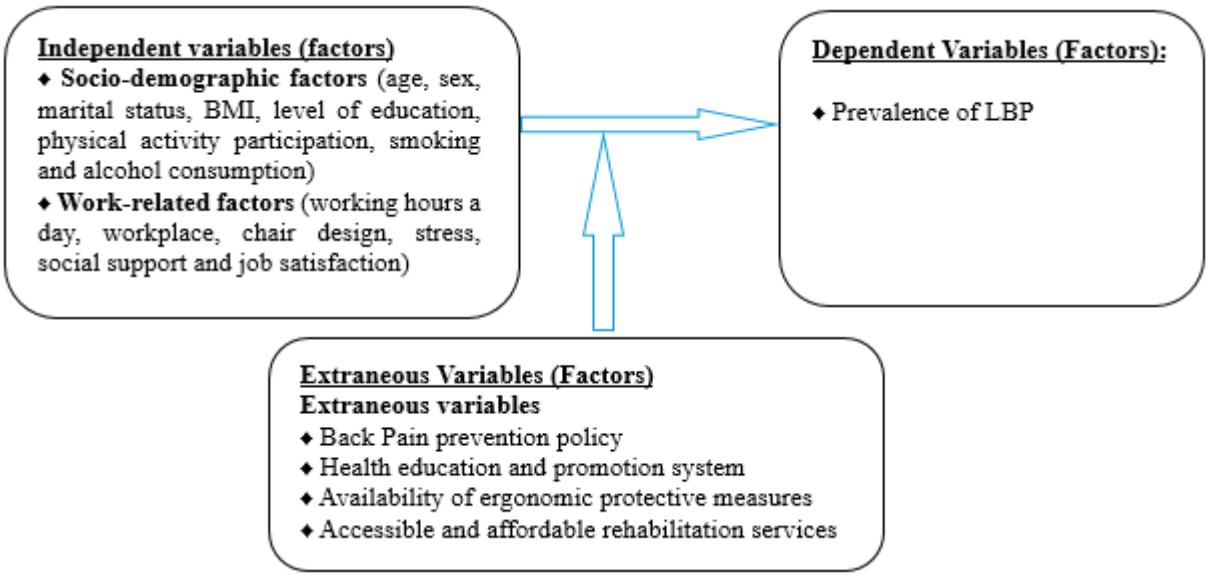
In addition, the HBM highlights cues to action, which are internal or external triggers that motivate individuals to act, such as experiencing pain symptoms, receiving health education, or observing colleagues affected by LBP. Finally, the model includes self-efficacy, which refers to an individual's confidence in their ability to successfully perform preventive behaviors such as maintaining correct posture, engaging in physical exercises, or modifying work habits.

Therefore, the Health Belief Model provides a suitable framework for this study as it helps to explain how personal beliefs and perceptions influence preventive and management behaviors related to low back pain among primary school teachers.

Conceptual Framework

Conceptual framework consists of figures that reflect the relationship between independent and dependent variables. This study assessed prevalence of LBP among PST by considering its occurrence during the last past year while the factors associated with LBP are measured in terms of physical, psychosocial, demographic and socioeconomic factors. This study depended on three variables: (i) dependent, (ii) independent, and (iii) intervening/extraneous variables.

Figure 2.1: Conceptual Framework



Source: Researcher developed, 2026

The prevalence and socio-economic impact of low back pain (LBP) are directly influenced by socio-demographic and work-related factors. Characteristics such as age, sex, BMI, lifestyle behaviors (physical activity, smoking, alcohol use), and education level affect individuals' vulnerability to LBP, while work-related conditions such as long working hours, poor chair design, workplace stress, limited social support, and low job satisfaction increase the risk of developing LBP.

Extraneous variables play a modifying and mediating role in this relationship. Effective back pain prevention policies, strong health education and promotion systems, the availability of ergonomic protective measures, and accessible rehabilitation services can reduce the negative effects of socio-demographic and work-related risk factors. Conversely, the absence of these supportive systems may worsen LBP prevalence and amplify its socio-economic impact on individuals, families, and the country.

III. RESEARCH METHODOLOGY

Research Design

The study was cross-section in design applying a quantitative strategy to obtain information on Low Back Pain among Primary School Teachers.

Study Population

The study population was schoolteachers obtained from teachers' records provided by school leaders who at the time of data collection was employed by Rwanda Education Board to teach in primary schools in four sectors of Rwamagana District. Data from district authorities of Rwamagana District at the entry of the school year 2023/24 show that there are 293 Primary School Teachers (PSTs) selected in 10 primary schools.

Sampling design

Determination of Sample size

The sample size was determined using a formula developed by TaroYamane (1967) sample size calculation formula, with a confidence level of 95% and a margin error of 0.05.

In this study, the sample size is 169 primary school teachers teaching in 10 primary schools from selected 4 sectors as indicated in the table 3.1.

Substituting

N=293, and e=0.05.

$n=293/1+293(0.05)^2= 293/1+293\times0.0025 = 293/1+0.732$

n= 169

Table 3.1: Study sample

Sector	School names	Number of teachers per school	Percentage of total	Number of teachers to be sampled per school	Percentage of total
Kigabiro	G S Rwamagana protestant	26	8.78	15	9.25
	EP Rwamagana Catholique	32	11.148	19	21.60
	GS Sovu	29	9.79	16	30.86
Muhazi	GS Kabare	22	7.43	13	8.02
	GS Nsinda	19	6.41	11	15.43
Musha	GS Rutoma	29	9.79	16	24.69
	GS Rusisiro	57	19.59	33	42.59
	EP Nyabisindu	13	8.78	8	46.91
Rubona	G S Byinza	26	8.78	15	9.25
	GS Rubona	40	13.85	23	22.22
TOTAL	**10**	**293**	100	**169**	**100**

Source: Calculation from the population, Researcher, 2025

Sampling technique

Cluster sampling method was used to draw samples from 24 schools (Clusters) of Kigabiro, Muhazi, Musha and Rubona Sectors of Rwamagana District, two semi-urban and two rural Sectors.

Inclusion and Exclusion Criteria

b) Inclusion Criteria

All cooperative teachers, aged from 19 to 65 years and full time male and female PST, with working experience of one year and above, was selected.

b) Exclusion Criteria

PSTs who have been employed within less than one year before the day of data collection, those with traumatic LBP and those who refused to give informed consent.

Teachers with a history of LBP due to trauma such as road traffic accidents, falls as well as conditions such pregnancy and/or other pathologies.

Data collection methods

Data Collection Instrument

A questionnaire was adopted from the Nordic Back Pain Questionaire (NBPQ) (Joanne O. C., 2007) and and the Oswestry Lower Back Pain Questionnaire (OLQ) (Fairbank JCT & Pynsent, PB (2000). This questionnaire has been validated and used in the assessment of Low Bak Pain in other studies based on existing validated and reliable scales, namely the Nordic Back Pain Questionnaire (NBPQ) and the Oswestry Lower Back Pain Questionnaire (OLQ). The questionnaire has three sections as follows:

Section A: Relationship between Socio-demographic factors and LBP

This self-constructed scale measured the socio-demographic information of the participants, where age was measured on a continuous scale to assist with analysis and interpretation. Categorical variables were used for gender, work experience, level of education, and marital status.

Intensity of pain assessment

Quantitatively, the participants were required to locate a painful area on a body chart and rate their pain experience on VAS of 0 – 100 mm in order to assess intensity of pain during the last twelve (12) months and last seven (7) days respectively. Four categories have to be identified for interpretation purposes of the VAS, namely 0 – 5 mm indicates no pain; 6 – 45 mm = mild pain; 46 – 75 mm = moderate pain; 76 – 100 mm = severe pain respectively (Jensen, Chen & Brugger, 2003). The score on the VAS is directly proportional to the intensity of the LBP.

Section C: The functional disability assessment

This scale comprises of questions that assess the functional disability of a client. It comprises of the following sections: sitting, standing, walking and lifting/bending. Each of the four sections had five questions. Thus, a total score of 20 can be achieved. A percentage was calculated for each participant. The higher the score obtained, the higher the functional level of the disability (Fairbank & Pynsent 2000). Interpretation of the calculated scores were as follows: 0 – 20% = minimal disability; 21 – 40% = moderate disability; 41 – 60% = severe disability; 61 – 80% = crippled and >81% = bed-bound or have an exaggeration of their symptoms.

Procedures of Data Collection

A pilot study was conducted on eighteen primary school teachers who met the inclusion criteria of this study to test the validity and reliability of the study instruments. Before data collection, a meeting with the participants was held to explain the purpose of the study and to request their voluntary participation after signing informed consent forms. The researcher answered participants' questions through direct conversation to ensure a common understanding of the questionnaire, which was prepared in both English and Kinyarwanda. A period of two weeks was given for the return of the questionnaires.

Reliability and validity

Reliability

Reliability referred to the degree to which the results obtained by a measurement and procedure could be replicated (Wong, Ong & Kuek, 2012). It also referred to the stability and consistency of the measuring tool in yielding similar results from the same population at different times. In this study, the variables of interest included low back pain (LBP) as the dependent variable, and prevalence of LBP and associated risk factors as independent variables. During the pilot study conducted for teachers who were not included in the sample, the researcher tested the questionnaire used to quantify these variables to determine whether it provided consistent responses.

The reliability of the questionnaire was assessed using Cronbach's Alpha coefficient. The overall Cronbach's Alpha value obtained for the questionnaire was 0.82, indicating good internal consistency of the instrument. Specifically, the items measuring prevalence of low back pain yielded a Cronbach's Alpha of 0.79, while items assessing associated risk factors yielded a Cronbach's Alpha of 0.84. Since all coefficients exceeded the acceptable threshold of 0.70, the instrument was considered reliable for data collection.

Validity

Validity meant measuring what was intended to be measured (Field, 2005). It was explained by the fact that an empirical study measured precisely the concept it was anticipated to measure. The pilot study helped the researcher to test the questionnaire and ensure that it measured the intended research concepts, namely the prevalence of LBP and its associated factors among primary school teachers (PST). The validity of this study ensured its credibility, dependability, and transferability.

Data Analysis

After the completion of data collection, the obtained data was entered, cleaned and edited using Excel software, then exported to Statistical Package for Social Sciences (SPSS) version 20 for analysis. Descriptive statistics were done to summarize the demographic data of the study sample in tables which was presented using frequency tables and expressed as percentages, means and standard deviations. The corrected data were presented using tables and percentages were used to compare different information, data stored, processing and reporting. Inferential statistics (bivariate and multivariate logistic regression analysis) were used to determine association between low back pain and risk factors. Chi square test of independence was computed, and the associations were described using odds ratio with 95% confidence interval and p-value ≤ 0.05.

Ethical Consideration

Ethical clearance to conduct this study was obtained from the MKU Institutional Review Board, and further permission was requested and obtained from Rwamagana District, which in turn allowed the researcher to conduct the study. The aim and objectives of the study were explained to the participants to help them understand the study and voluntarily participate. Informed consent was provided and obtained from the participants. Free withdrawal from study was allowed at any time. Anonymous and confidential use of data from the study was ensured and used solely for the research objectives. The study results were submitted to MINEDUC, the Ministry of Health (MoH), and Rwamagana District.

IV. RESEARCH FINDINGS AND DISCUSSION

This chapter talks about the presentation, analysis, interpretation and discussion of results. The data analysis was done depending on specific objectives. Frequencies and percentages were determined to distribute the primary school teachers who participated in this study. Then, the first objective on prevalence of low back pain was presented followed by socio-demographic characteristics and Physical activity participation related factors associated with low back pain were established. Finally, multivariable logistic model was performed to determine the independent factors associated with Low Back pain by controlling the potential confounding variables. The results are presented in frequency tables and graphs.

Response rate

A total of 169 questionnaires were distributed to primary school teachers in Rwamagana District, and 169 were successfully completed and returned, yielding a 100% response rate. This exceptional response rate indicated full participation of the selected respondents in the study and enhanced the reliability, representativeness, and credibility of the findings. The

complete return of questionnaires minimized the risk of non-response bias and provided sufficient data for comprehensive analysis of the socio-demographic characteristics and other study variables among the participants.

Socio-demographic characteristics of the primary school teachers in Rwamagana District, 2025

Table 4.1 presents the socio-demographic characteristics of primary school teachers in Rwamagana District. The analysis includes variables such as age, gender, marital status, residence, level of education, religion, and employment status, providing an overview of the personal and demographic profiles of the study participants.

Table 4.1. Socio-demographic characteristics of the primary teachers in Rwamagana District, 2025

Variables	Frequency(n=169)	Percent (%)
Age of teachers (years)		
Under 30	56	33.1
31-40	56	33.1
41 and above	57	33.7
Weight status		
Underweight	7	4.1
Normal	96	56.8
Overweight	43	25.4
Obesity	23	13.6
Gender		
Male	53	31.4
Female	116	68.6
Marital status		
Single	42	24.9
Married	122	72.2
Divorced /Widowed	5	3.0
Living areas		
Urban	121	71.6
Rural	48	28.4
Education level		
Secondary level	145	85.8
University level	24	14.2
Alcohol consumption		
Never	124	74.0
Sometimes	43	25.4
Always	1	0.6
Smoking		
Yes	3	1.8
No	166	98.2
Weekly exercise frequency		
None	81	47.9
Once	44	26.0.0
Two times and above	17	10.1
Three times and above	27	16

Source: Primary data, 2025

Table 4.1 shows that most primary school teachers in Rwamagana District were female (68.6%), married (72.2%), and lived in urban areas (71.6%). Most teachers were of normal weight (56.8%) and had completed secondary education (85.8%). Lifestyle behaviors indicated low physical activity, with 47.9% not exercising weekly, and minimal smoking (1.8%) and alcohol use (0.6% always). Teachers were mostly female, married, urban residents with normal weight and low engagement in physical activity.

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Table 4.1 Work related factors of Low back pain among primary school teachers

Characteristics	(Frequency n=169)	Percent (%)
Teaching experience (years)		
1-2 years	12	7.1
2-3 years	28	16.6
3-4 years	34	20.1
4-5 years	10	5.9
More than 5 years	85	50.3
Daily hours spent standing		
3-4 hours	1	0.6
5-6 hours	6	3.6
6 hours and above	162	95.9
Number of classes taught per day		
1 class	1	0.6
2-3 classes	34	20.1
4-5 classes	34	20.1
6-8 classes	100	59.2
Number of students per class		
40 and less	1	0.6
41-50	34	20.1
51-60	34	20.1
61 and above	100	59.2
Type of chair used at work		
With lumbar support	35	20.7
Without lumbar support	134	79.3
Workplace stress level		
None	7	4.1
Low	29	17.2
Medium	86	50.9
High	47	27.8
Job satisfaction		
Dissatisfied	10	5.9
Satisfied	112	66.3
Very satisfied	47	27.8
Social support from colleagues/supervisors		
Poor	11	6.5
Good	78	46.2
Very good	80	47.3

Source: Primary data, 2025

Table 4.2 presents the work-related characteristics of primary school teachers in Rwamagana District. Most teachers had more than five years of teaching experience (50.3%). The majority spent six hours or more standing daily (95.9%) and taught 6–8 classes per day (59.2%) to 61 or more students per class (59.2%).

Regarding workplace conditions, 79.3% used chairs without lumbar support, and high or medium stress levels were reported by 78.7% of teachers. Most were satisfied with their job (66.3%), while social support from colleagues or supervisors was generally good or very good (93.5%).

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4.1 Presentation of findings

4.1.1 Prevalence of low back pain among primary school teachers in Rwamagana District in Eastern Province of Rwanda

This section presents the findings on the prevalence of low back pain (LBP) among primary school teachers in Rwamagana District. Understanding the prevalence is essential to identify the magnitude of the problem and to inform strategies for prevention and management of LBP within this population.

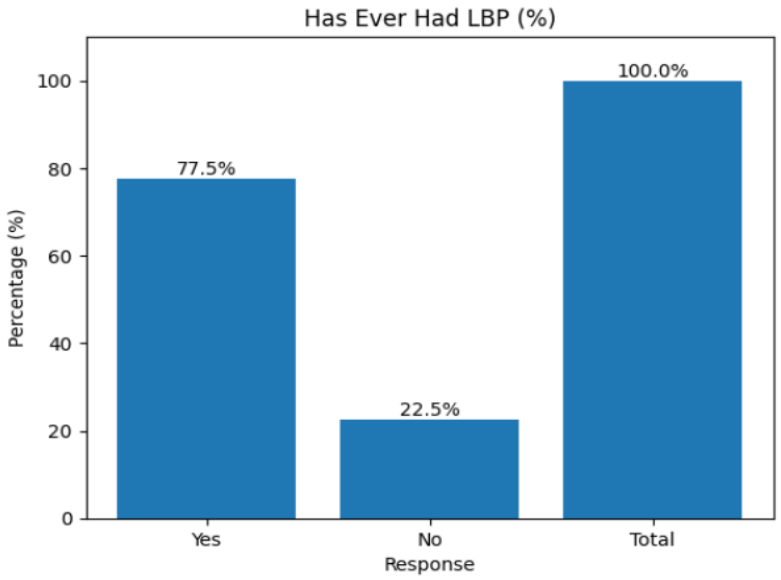

Figure 4.1. Prevalence of low back pain among primary school teachers in Rwamagana District in Eastern Province of Rwanda

Figure 4.1 shows that Out of the respondents, **77.5%** reported that they have ever had low back pain (LBP). Meanwhile, **22.5%** indicated that they have never experienced LBP.

4.1.2 Association between socio-demographic characteristics and low back pain among teachers

This section presents the analysis of the relationship between socio-demographic factors and the occurrence of low back pain (LBP) among primary school teachers. Table 4.3 summarizes how variables such as age, gender, marital status, residence, education level, and lifestyle behaviors are associated with the prevalence of LBP in the study population.

Table 4.2 Association between socio-demographic characteristics and low back pain among teachers

Variable	With Low Back Pain		Without Low Back Pain		P-Value
	N	%	N	%	
Age of teachers (years)					**0.012**
Under 30	37	28.2	19	50	
31–40	43	32.8	13	34.2	
41 and above	51	38.9	6	15.8	
Weight status					0.303
Underweight	7	5.3	1	2.6	
Normal	68	51.9	25	65.8	
Overweight	55	42	11	28.8	
Obese	1	0.8	1	2.6	
Gender					**0.016**
Male	35	26.7	18	47.4	
Female	96	73.3	20	52.6	
Marital status					**0.003**

Single/Cohabited	24	18.3	18	47.4	
Married	102	77.9	20	52.6	
Divorced	4	3.1	0	0	
Widowed	1	0.8	0	0	
Residence					0.933
Rural	94	71.8	27	71.1	
Urban	37	28.2	11	28.9	
Education level					**0.461**
Secondary level	111	84.7	34	89.5	
University level	20	15.9	4	10.5	
Stress at work					**<0.001**
None	1	0.6	6	3.5	
Low	15	8.9	14	8.3	
Medium	73	43.2	13	7.7	
High	42	24.8	5	3	
Alcohol consumption					0.172
Never	98	74.8	27	71.1	
Sometimes	33	25.2	10	26.3	
Always	0	0	1	2.6	
Smoking					0.650
Yes	2	1.5	1	2.6	
No	129	98.5	37	97.4	

Source: Primary data, 2025

Table 4.3 presents the association between socio-demographic characteristics and low back pain (LBP) among primary school teachers. The prevalence of LBP was significantly associated with age ($p = 0.012$), gender ($p = 0.016$), marital status ($p = 0.003$), and stress at work ($p < 0.001$). Specifically, teachers aged 41 years and above (38.9%), female teachers (73.3%), and married teachers (77.9%) reported higher rates of LBP. Teachers experiencing medium or high stress levels at work were also more likely to report LBP.

Other variables, including weight status, residence, education level, alcohol consumption, and smoking, were not significantly associated with LBP ($p > 0.05$).

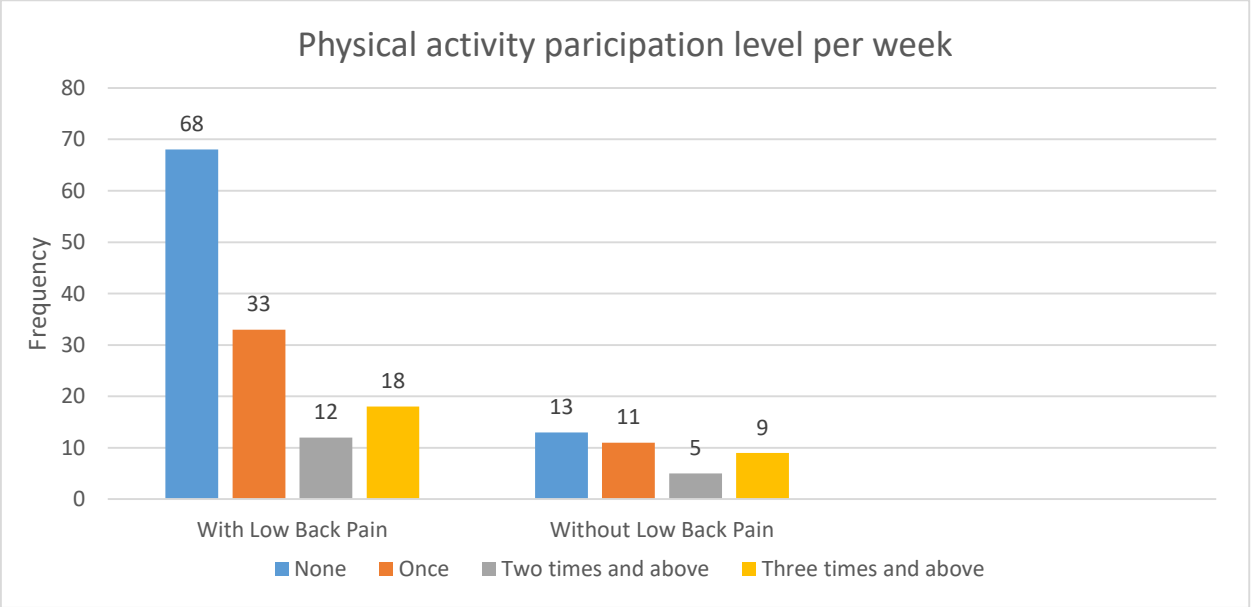

Figure 4.2. Association between physical activity and low back pain among primary school teachers, Rwamagana District.

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The figure shows that teachers with low back pain (LBP) were more likely to report no physical activity (68 teachers) or exercise only once per week (33 teachers). Participation in physical activity two times or more per week (12 teachers) or three times and above (18 teachers) was lower among teachers with LBP.

Among teachers without LBP, fewer reported no physical activity (13 teachers) or once per week (11 teachers), while participation in physical activity two times or more (5 teachers) and three times and above (9 teachers) was relatively higher compared to those with LBP.

4.1.3 Association between work-related factors and low back pain among primary school teachers in Rwamagana District, 2025

This section presents an analysis of the relationship between work-related factors and the occurrence of low back pain (LBP) among primary school teachers. The study examined factors such as teaching experience, daily hours spent standing, number of classes taught, class size, type of chair used, workplace stress level, job satisfaction, and social support from colleagues or supervisors to determine their influence on the prevalence of LBP in the study population.

Table 4.3 Association between work-related factors and low back pain among primary school teachers in Rwamagana District, 2025 (n = 169)

Variable	With Low Back Pain		Without Low Back Pain		χ^2	P-Value
	N	%	N	%		
Years in teaching career					11.284	**0.024**
1–2 years	6	4.6	6	15.8		
2–3 years	18	13.7	10	26.3		
3–4 years	24	18.3	10	26.3		
4–5 years	8	6.1	2	5.3		
> 5 years	75	57.3	10	26.3		
Hours spent standing per day					9.642	**0.008**
3–4 hours	0	0	1	2.6		
5–6 hours	3	2.3	3	7.9		
≥ 6 hours	128	97.7	34	89.5		
Number of classes taught per day					10.317	**0.016**
1 class	0	0	1	2.6		
2–3 classes	20	15.3	14	36.8		
4–5 classes	25	19.1	9	23.7		
6–8 classes	86	65.6	14	36.8		
Number of students per class					12.094	**0.007**
≤ 40	0	0	1	2.6		
41–50	20	15.3	14	36.8		
51–60	25	19.1	9	23.7		
≥ 61	86	65.6	14	36.8		
Type of chair used at workplace					18.476	**<0.001**
With lumbar support	18	13.7	17	44.7		
Without lumbar support	113	86.3	21	55.3		
Level of stress at workplace					29.803	**<0.001**
None	1	0.8	6	15.8		
Low	12	9.2	16	42.1		
Medium	70	53.4	16	42.1		
High	48	36.6	0	0.		
Job satisfaction					14.552	**0.002**
Dissatisfied	9	6.9	1	2.6		
Satisfied	88	67.2	24	63.2		
Very satisfied	34	26	13	34.2		
Social support from colleagues/supervisors					13.219	**0.004**
Poor	10	7.6	1	2.6		
Good	65	49.6	13	34.2		
Very good	56	42.7	24	63.2		

Source: Primary data, 2025

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Table 4.4 shows a significant association between several work-related factors and low back pain among primary school teachers in Rwamagana District. Years of teaching experience were significantly associated with low back pain ($\chi^2 = 11.284$, $p = 0.024$), with teachers who had more than five years of experience reporting a higher prevalence of low back pain.

Hours spent standing per day also showed a significant association with low back pain ($\chi^2 = 9.642$, $p = 0.008$). Many teachers with low back pain spent six hours or more standing per day, indicating prolonged standing as an important occupational risk factor.

The type of chair used at the workplace was strongly associated with low back pain ($\chi^2 = 18.476$, $p < 0.001$). Most teachers who experienced low back pain used chairs without lumbar support, highlighting the role of poor ergonomics.

Additionally, the level of stress at the workplace had a highly significant association with low back pain ($\chi^2 = 29.803$, $p < 0.001$). Teachers reporting medium to high stress levels were more likely to experience low back pain compared to those with low or no stress.

4.1.4 Multivariable analysis of predictors of low back pain among primary school teachers

This section presents the results of the multivariable logistic regression analysis conducted to identify independent predictors of low back pain among primary school teachers in Rwamagana District. Variables that showed an association in the bivariate analysis were entered into the model to control potential confounding factors. Crude Odds Ratios (COR), Adjusted Odds Ratios (AOR), 95% Confidence Intervals (CI), and p-values are presented in Table 4.5.

Table 4.4 Multivariable analysis of predictors of low back pain among primary school teachers in Rwamagana District, 2025

Variables	COR	95% CI		p-value	AOR	95% CI		p-value
		Lower	Upper			Lower	Upper	
Age (years)								
Under 30 (Ref)	Ref				Ref			
31–40	1.84	1.02	3.33	**0.041**	1.52	0.81	2.87	0.189
≥ 41	2.97	1.58	5.59	**0.001**	2.31	1.12	4.76	**0.023**
Gender								
Male (Ref)	Ref				Ref			
Female	2.46	1.23	4.91	**0.011**	1.98	1.01	3.89	**0.046**
Marital status								
Single/Cohabited (Ref)	Ref				Ref			
Married	3.83	1.92	7.63	**<0.001**	2.67	1.24	5.74	**0.012**
Years in teaching career								
≤ 5 years (Ref)	Ref				Ref			
> 5 years	3.41	1.71	6.81	**<0.001**	2.54	1.19	5.4	**0.016**
Hours spent standing per day								
≤ 5 hours (Ref)	Ref				Ref			
≥ 6 hours	4.92	1.63	14.88	**0.005**	3.21	1.02	10.09	**0.046**
Number of classes taught per day								
≤ 3 classes (Ref)	Ref				Ref			
≥ 6 classes	3.06	1.56	6	**0.001**	2.12	1.02	4.41	**0.044**
Number of students per class								
≤ 50 students (Ref)	Ref				Ref			
≥ 61 students	3.89	1.94	7.8	**<0.001**	2.78	1.29	5.97	**0.009**
Type of chair used at workplace								
With lumbar support (Ref)	Ref				Ref			
Without lumbar support	5.09	2.45	10.55	**<0.001**	3.84	1.76	8.37	**0.001**

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Level of stress at workplace								
None/Low (Ref)	Ref				Ref			
Medium	4.27	1.94	9.4	**<0.001**	2.91	1.22	6.95	**0.016**
High	7.63	3.19	18.22	**<0.001**	4.98	1.94	12.76	**0.001**
Job satisfaction								
Very satisfied (Ref)	Ref				Ref			
Satisfied	1.88	0.97	3.66	0.061	1.42	0.7	2.9	0.331
Dissatisfied	4.12	1.37	12.36	**0.012**	2.96	1.01	8.65	**0.048**
Social support from colleagues/supervisors								
Very good (Ref)	Ref				Ref			
Good	1.94	0.98	3.86	0.057	1.51	0.74	3.07	0.259
Poor	5.26	1.53	18.11	**0.009**	3.87	1.08	13.88	**0.037**

AOR = Adjusted Odds Ratio; COR = Crude Odds Ratio; CI = Confidence Interval

Source: Primary data, 2025

This section presents the results of the multivariable logistic regression analysis conducted to identify independent predictors of low back pain among primary school teachers in Rwamagana District. Variables that showed an association in the bivariate analysis were entered into the model to control potential confounding factors. Crude Odds Ratios (COR), Adjusted Odds Ratios (AOR), 95% Confidence Intervals (CI), and p-values are presented in Table 4.5.

Interpretation of Table 4.5

The multivariable analysis revealed that several factors remained significantly associated with low back pain after adjustment. Teachers aged 41 years and above were more than twice as likely to experience low back pain compared to those under 30 years (AOR = 2.31; 95% CI: 1.12–4.76; p = 0.023). Female teachers also had higher odds of low back pain than male teachers (AOR = 1.98; 95% CI: 1.01–3.89; p = 0.046).

Marital status was a significant predictor, with married teachers being more likely to report low back pain compared to single/cohabited teachers (AOR = 2.67; 95% CI: 1.24–5.74; p = 0.012). Similarly, teachers with more than five years of teaching experience had increased odds of low back pain (AOR = 2.54; 95% CI: 1.19–5.40; p = 0.016).

Workload-related factors were also significant. Teachers who spent six hours or more standing per day were over three times more likely to have low back pain (AOR = 3.21; 95% CI: 1.02–10.09; p = 0.046). Teaching six or more classes per day (AOR = 2.12; 95% CI: 1.02–4.41; p = 0.044) and handling classes with 61 or more students (AOR = 2.78; 95% CI: 1.29–5.97; p = 0.009) were also independent predictors.

Ergonomic and psychosocial factors showed strong associations. Teachers using chairs without lumbar support had significantly higher odds of low back pain (AOR = 3.84; 95% CI: 1.76–8.37; p = 0.001). Additionally, medium and high levels of workplace stress were associated with increased odds of low back pain (AOR = 2.91; 95% CI: 1.22–6.95; p = 0.016 and AOR = 4.98; 95% CI: 1.94–12.76; p = 0.001, respectively).

Finally, teachers who were dissatisfied with their job (AOR = 2.96; 95% CI: 1.01–8.65; p = 0.048) and those reporting poor social support from colleagues or supervisors (AOR = 3.87; 95% CI: 1.08–13.88; p = 0.037) were significantly more likely to experience low back pain.

4.2 Discussion

The present study found that 77.5% of primary school teachers reported experiencing low back pain. This indicates that LBP is a highly prevalent occupational health problem among teachers in Rwamagana District, affecting more than three-quarters of the study population. This prevalence is comparable to findings from other low- and middle-income countries, where teaching has been identified as a high-risk profession for musculoskeletal disorders.

Similar prevalence rates have been reported in recent studies. For instance, a study conducted in Ethiopia reported a prevalence of LBP among primary school teachers of 74.8% (Tadesse et al., 2021), while research in Nigeria found a prevalence of 70–80% among teachers (Adegoke et al., 2020). Likewise, a study in Kenya reported that approximately 72%

of teachers experienced LBP within a 12-month period (Munyoki & Mutua, 2022). These similarities may be attributed to comparable working conditions, including prolonged standing, large class sizes, and limited ergonomic support.

However, the prevalence observed in this study is higher than that reported in some high-income countries. For example, a study in Germany reported a lower prevalence of around 55% (Seibt et al., 2020), and a study in Japan reported 48% (Yamamoto et al., 2021). The divergence may be explained by better ergonomic infrastructure, smaller class sizes, and stronger occupational health policies in those settings.

The findings showed a significant association between LBP and age, gender, marital status, and stress at work. Teachers aged 41 years and above were more likely to experience LBP, which aligns with existing literature suggesting that advancing age increases susceptibility to musculoskeletal disorders due to degenerative changes in the spine and reduced muscle strength. Similar findings were reported in studies conducted in Uganda (Nsubuga et al., 2021) and China (Zhang et al., 2022), where older teachers had significantly higher odds of LBP.

Female teachers were found to have a higher prevalence of LBP than their male counterparts. This finding is consistent with studies from Rwanda's neighboring countries and beyond. For example, studies in Tanzania (Mosha et al., 2020) and India (Patel et al., 2023) reported that female teachers were significantly more affected by LBP. This may be due to biological factors, greater exposure to household responsibilities in addition to teaching duties, and differences in pain perception. However, some studies, such as one conducted in Saudi Arabia (Alghadir et al., 2021), reported no significant gender difference, highlighting contextual variations.

Marital status was also significantly associated with LBP, with married teachers reporting higher prevalence. This finding is in line with studies from Nigeria and Ethiopia, which suggest that increased family responsibilities and psychosocial stress among married individuals may exacerbate musculoskeletal pain (Alem et al., 2020; Adegoke et al., 2020). Nonetheless, some studies, such as one from Brazil (Silva et al., 2022), found no association between marital status and LBP, indicating mixed evidence.

In contrast, weight status, residence, education level, alcohol consumption, and smoking were not significantly associated with LBP in this study. Similar non-significant findings have been reported in studies conducted in Kenya (Munyoki & Mutua, 2022) and Nepal (Shrestha et al., 2021). However, other studies, such as one from China (Zhang et al., 2022), reported obesity as a significant predictor of LBP, suggesting that lifestyle-related risk factors may vary across populations.

Work-related factors played a critical role in the occurrence of LBP among teachers in this study. Teachers with more than five years of teaching experience were significantly more likely to report LBP. This finding is consistent with studies conducted in Ethiopia (Tadesse et al., 2021) and Pakistan (Khan et al., 2020), which reported that cumulative exposure to teaching-related physical demands increases the risk of chronic LBP over time.

Prolonged standing, particularly standing for six hours or more per day, was strongly associated with LBP. This supports evidence from studies in Uganda (Nsubuga et al., 2021) and India (Patel et al., 2023), which identified prolonged standing as a major occupational risk factor for teachers. Prolonged static postures increase spinal loading and muscle fatigue, contributing to low back pain.

The type of chair used at the workplace was one of the strongest predictors of LBP. Teachers who used chairs without lumbar support were significantly more likely to experience LBP. This finding is consistent with ergonomic studies conducted in South Africa (Smith et al., 2020) and Malaysia (Rahman et al., 2022), which emphasized the protective role of lumbar support in reducing spinal strain. The lack of ergonomic furniture in many public schools in low-income settings may explain this strong association.

Workplace stress also showed a highly significant association with LBP. Teachers experiencing medium to high stress levels were more likely to report LBP, a finding that aligns with studies from China (Zhang et al., 2022) and Finland (Haukka et al., 2021), which highlighted the interaction between psychosocial stress and musculoskeletal pain. Stress may increase muscle tension and pain perception, thereby exacerbating LBP.

The multivariable logistic regression analysis confirmed that age ≥41 years, female gender, being married, longer teaching experience, prolonged standing, high teaching workload, large class sizes, poor ergonomic conditions, high workplace stress, job dissatisfaction, and poor social support were independent predictors of LBP.

The strong association between large class sizes (≥61 students) and LBP reflect the increased physical and mental workload associated with classroom management in overcrowded classrooms. Similar findings were reported in Kenya and Nigeria, where large pupil–teacher ratios were linked to musculoskeletal disorders among teachers (Munyoki & Mutua, 2022; Adegoke et al., 2020).

Job dissatisfaction and poor social support were also significant predictors, reinforcing the importance of psychosocial factors. Studies from Sweden (Bergström et al., 2020) and Ethiopia (Alem et al., 2020) similarly reported that low job satisfaction and weak collegial support increased the risk of LBP. However, some studies, such as one conducted in Japan (Yamamoto et al., 2021), did not find a significant association between job satisfaction and LBP, suggesting contextual differences in workplace environments.

V. CONCLUSIONS

Low back pain is highly prevalent among primary school teachers in Rwamagana District and is influenced by a combination of socio-demographic and work-related factors. Both physical workload and psychosocial conditions at the workplace contribute significantly to the occurrence of low back pain.

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