ASSESSMENT OF ERGONOMIC HAZARDS AMONG HEALTH CARE WORKERS IN UNIVERSITY OF BENIN TEACHING HOSPITAL,

BY

AIREN-OGIEVA EFOSA DONALDSON

MED1606049

AKAEZE AFAMAFUNA STEPHEN

MED1606050

DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE,

COLLEGE OF MEDICINE, UNIVERSITY OF BENIN,

BENIN CITY, EDO STATE, NIGERIA

A ONE-YEAR PROJECT PRESENTED TO THE DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) DEGREE

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CERTIFICATION

This is to certify that this research study titled "**ASSESSMENT OF ERGONOMIC HAZARDS AMONG HEALTH CARE WORKERS IN UBTH**" was carried out by **AKAEZE AFAMAFUNA STEPHEN** with matriculation number **MED1606050** and **AIREN-OGIEVA DONALDSON EFOSA** with matriculation number **MED1606049** under supervision in the Department of Public Health and Community Medicine, College of Medical sciences, University of Benin as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) degree.

PROF. (Mrs.) E.C. ISAH **DATE**
MBBS; MSc; FMCPH; FWACP; MD
Professor/Consultant (Project Supervisor)
Department of Public Health and Community Medicine,
School of Medicine,
College of Medical Sciences.
University of Benin,
Benin City, Edo State, Nigeria.

DR. N. MOKOGWU **DATE**
MBBS; MPH; FWACP
Consultant (Project Supervisor),
Department of Public Health and Community Medicine,
School of Medicine,
College of Medical Sciences.
University of Benin,
Benin City, Edo State, Nigeria.

DR. O.E. OBARISIAGBON **DATE**
Associate Professor/Consultant and Head of Department,
Department of Public Health and Community Medicine,
School of Medicine,
College of Medical Sciences,
University of Benin.
Benin City, Edo State, Nigeria.

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DECLARATION

We hereby declare that this work is original and was carried out by the under-listed researchers under the supervision of Prof. (Mrs) E. C. Isah and Dr. N. Mokogwu and has not been published elsewhere for the award of a degree or certificate.

AKAEZE AFAMAFUNA STEPHEN
MED1606050
afamakaeze@gmail.com
07025070230

AIREN-OGIEVA DONALDSON EFOSA
MED1606049
airenogievaefosadonalson@gmail.com
08102486037

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ACKNOWELEDGEMENTS

We would like to acknowledge God Almighty, who has given us the opportunity to be here at the end of our medical school journey and the grace and strength to carry out this project to completion.
We sincerely thank our supervisors, Prof. (Mrs.) E.C. Isah and Dr. N. Mokogwu, for their unwavering guidance, support, and patience throughout the course of this work. May God bless you abundantly, Sir.
We appreciate the Department of Public Health and Community Medicine, University of Benin, for providing the research opportunity.

I also express heartfelt appreciation to my parents, Mr. Ronald Airen Ogieva and Mrs. Esther Ighokpozi Ogieva, for their selfless contributions to my medical training.
To my siblings – Mr. Osahenrumwen Marvelous Airen-Ogieva, Mrs. Osayimwense Joy Avanrenren, Miss Osakioduwa Blessing Airen-Ogieva, Mr. Osamuyimen Justice Airen-Ogieva, Mr. Eghosasere Courage Airen-Ogieva, Miss Aisosa Divinefavour Airen-Ogieva, and Mr. Nosakhare Airen-Ogieva, thank you for being pillars of strength during my medical school journey.
Special thanks to Blessing Taiwo Omosekeji, Dr. Ezie Great Oghenetejiri, Dr. Stephen Afamafuna Akaeze, Engr. Nelson Imade, Nr Osayimwense Joy Avanrenren, and Dr. Emmanuel Dennis Eze-Odohi for their invaluable assistance.
I gratefully acknowledge all individuals who contributed to this project's success. To my friends, your encouragement and support made this journey unforgettable. Thank you for being an integral part of my life.

Airen-Ogieva Efosa Donaldson

I would like to express my deepest gratitude to my family, who have been a constant pillar of support throughout my life and medical journey. To my loving parents, Engr. Victor Akaeze and Mrs. Patience Akaeze, and my amazing siblings—Adaeze, Buchi, Nkechi, and Uche Akaeze—thank you for always being there for me in times of need.
I also want to acknowledge my project partner, Efosa, and my best friend, Osafanmen Ighodaro, along with a special mention to Samuel Ukalike. To my friends and colleagues who have encouraged, supported, and accompanied me through medical school, thank you for making this journey worthwhile.

Akaeze Afamafuna Stephen

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DEDICATION

This project is humbly dedicated to the Almighty God, whose unwavering love, guidance, and protection sustained us throughout its duration.

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LIST OF ABBREVIATIONS

HCF:	Health Care Facilities
HCW:	Health Care Workers
HSCA:	Healthcare and Social Assistance Sector
ISCO:	International Standard Classification of Occupations
MSD:	Musculoskeletal Disorders
NMQ:	Nordic Musculoskeletal Questionnaire
UBTH:	University of Benin Teaching Hospital
WRMSD:	Work Related Musculoskeletal Disorders
WMS:	Work Related Musculoskeletal Symptoms

DEFINITON OF TERMS

Ergonomics: The International Ergonomics Association defines Ergonomics as the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design to optimize human well-being and overall system performance.

Ergonomic Hazards: Ergonomic hazards are physical conditions that may pose a risk of injury to the musculoskeletal system due to poor ergonomics. These hazards include awkward or static postures, high forces, repetitive motion, or short intervals between activities.

Health care workers: are all the people involved in work actions whose primary goal is to improve health, including doctors, nurses, midwives, public health professionals, laboratory technicians, health technicians, medical and non-medical technicians, personal care workers and community health workers. Health management and support employees such as cleaners, drivers, hospital administrators, district health managers, and social workers, as well as other occupational groups in health-related activities as described by the International Standard Classification of Occupations (ISCO-08), are also included in the definition.

Musculoskeletal disorders: are defined as musculoskeletal system and connective tissue diseases and disorders that occur as a result of a body reaction (e.g., bending, climbing, crawling, reaching, twisting), overexertion, or repetitive motion. MSD examples include: Sprains, strains, and tears, Back pain, Carpal tunnel syndrome, Hernia.

Occupational Health: The International Labour Organization and the World Health Organization defined occupational health as the promotion and maintenance as the highest degree of physical, mental and social well-being of workers in all occupations by preventing

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departures from health, controlling risk and the adaptation of work to people and people to their jobs.

ABSTRACT

Background: Occupational health aims to promote and maintain the highest level of physical, mental, and social well-being among workers, including healthcare workers (HCWs), who face significant workplace risks. Despite being the backbone of any health system, HCWs are frequently exposed to hazards such as needle stick injuries, infections, back injuries, and stress, often prioritizing patient care over their own well-being. Protecting the health of HCWs not only safeguards their welfare but also enhances the quality of patient care and strengthens healthcare systems. Musculoskeletal disorders (MSDs), particularly work-related musculoskeletal disorders (WRMSDs), pose a significant risk to HCWs due to the physical demands of their work, including heavy lifting and awkward postures. Preventing WRMSDs requires the application of ergonomic principles, such as proper workspace design, the use of assistive devices, and maintaining correct posture during tasks. Ergonomic interventions can reduce the risk of MSDs, improve safety, and enhance job performance, benefiting both healthcare workers and the patients they serve.

Objectives: The study was carried out to investigate the types and prevalence of musculoskeletal disorders, ergonomic risk factors and coping strategies adopted by healthcare workers in University of Benin Teaching Hospital.

Methodology: A descriptive cross-sectional study was carried out among 329 healthcare workers using a stratified random sampling technique for selection. Structured self-administered questionnaires were used for data collection and data was analyzed with IBM SPSS Version 27.0.1 software utilizing univariate, bivariate and multivariate analysis. The level of significance was set at $p < 0.05$.

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Results: The mean age of the respondents was 29.17 years with a standard deviation of 6.84 with 62.3% of the respondents being female, while 37.7% were male. The most common musculoskeletal disorder among respondents was lower back pain, reported by 246 (74.8%). Neck pain affected 236 (71.7%) respondents, while 202 (61.4%) experienced upper back pain. Musculoskeletal discomfort was reported by 57.8% of respondents over the past 12 months, with a higher rate of 83.3% experiencing symptoms in the last 7 days. Over two-thirds of respondents, 35.6% had the risk factors of musculoskeletal disorders and majority of respondents utilized self-management techniques like rest and exercise to cope with the musculoskeletal strain.

Conclusion: The 12-month prevalence of MSDs was 57.8% while the 7-day prevalence was 83.3% with the lower back and neck being the most affected anatomical regions signifying an urgent need for interventions to reduce the prevalence of MSDs.

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INTRODUCTION

1.1BACKGROUND

Occupation health is concerned with the promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupations. Occupational health is essentially preventive, dealing with health and safety at work. It involves identification and prevention of injuries, disease and cause of death incurred in the work place. Health care workers are also at potential risk of harm from exposure to numerous hazardous agents encountered in their workplace.[1]

Health personnel are the foundation of any well-functioning health-care system. Health workers should have the right to healthy and safe working circumstances in order to maintain their own health while contributing to ensuring the right to health for everyone.[2]

Previous studies have shown that occupational injuries and illnesses among HCWs ranked among the highest of any industry. For instance, in 2017 the annual costs of occupational illnesses and injuries in the health care and social services sector in Great Britain were the highest among all sectors, estimated at the equivalent of US$ 3.38 billion.[3]

The Healthcare and Social Assistance sector (HCSA) has one of the highest rates of work-related injuries and illnesses and it is still on the rise in the United States of America. The Bureau of Labor Statistics (BLS) noted a 40% rise in the number of injury and illness cases in 2020.[4]

According to Oluwagbemi[5], healthcare facilities in Nigeria have grown significantly in size, sophistication, and diversity over the past three decades, presenting challenges in maintaining best practices and the necessary equipment for high-risk clinical procedures. Despite these advancements, protecting the health and well-being of frontline healthcare workers (HCWs) remains challenging. In fulfilling their duties, HCWs are often exposed to hazards that can

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Health personnel are the foundation of any well-functioning health-care system. Health workers should have the right to healthy and safe working circumstances in order to maintain their own health while contributing to ensuring the right to health for everyone.[1]
The hazards in Health care facilities are classified by WHO (2002) into physical, biological, mechanical, ergonomic, chemical and psycho-social.
Previous studies have shown that occupational injuries and illnesses among HCWs ranked among the highest of any industry.

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severely affect their health and quality of life, which also impacts their families. Therefore, HCWs require protection from workplace hazards just as much as employees in other high-risk industries such as mining and construction.[5]

Health care workers face a wide range of hazards on the job; including needle stick injuries, direct infections, back injuries, latex allergy, violence, and stress. While tasked with caring for the sick and injured, Healthcare workers are often perceived as being immune to injury or illness. Their patients take precedence, and they are frequently expected to prioritize their patients' needs over their own well-being. However, protecting the health of HCWs not only benefits them but also enhances the quality of patient care and strengthens the overall health system.[61]

In the fifth century B.C., Hippocrates used ergonomic principles in his description of how a surgeon's workspace should be designed and how the tools should be arranged during surgery to maximize safety and efficiency.[6] Inappropriate adaptation of the workspace could predispose healthcare workers to musculoskeletal disorders.

Musculoskeletal disorders are a common and costly health condition affecting 1.71 billion people globally in 2019, which includes workers. In Australia, work-related musculoskeletal disorders (WRMSDs) have been identified as a leading work health and safety (WHS) problem in terms of frequency and costs, exceeding $24 billion AUD in 2012–13[7]

Work-related musculoskeletal disorders (WRMSD) are said to occur when; the working environment and job performance both play a significant role in the condition; and/or the condition worsens or lasts longer due to working conditions.[8]

The National Institute for Occupational Safety and Health (NIOSH) of the Centers for Disease Control and Prevention (CDC) published an assessment of evidence for work-related MSDs in 1997. Work situations that might cause WMSD include routine lifting of large things, daily

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exposure to whole-body vibration, routine overhead work, working with the neck in chronic flexion, and performing repetitive forceful tasks.[8]

Work-related musculoskeletal disorders are responsible for morbidity, lowering the quality of the workers' life and reducing productivity in many working populations. Work-related musculoskeletal disorder affecting health care providers should never be treated lightly and is the most expensive form of work-related disabilities attributing to about 40% of all costs towards the treatments.[9,10]

Back pain cases account for the majority of work-related musculoskeletal disorder reports and results in a significant number of missed workdays. These lost working days almost certainly have a significant impact on the quality and cost of healthcare.[11]

According to the World Health Organization (WHO), between 44% and 83% of nurses in clinical settings in Africa have chronic lower back pain, compared to 18% among office workers[12]. Chronic back pain is one example of a musculoskeletal disorder (MSD) caused by exposure to force, vibration, repetitive motion, and awkward posture[13]. To prevent MSDs, the principles of ergonomics can be applied to design work tasks that suit the capabilities of workers[14]. The use of an extra pair of hands while working which is provided by technical assistants, ensuring ergonomic considerations involving equipment/ instrument design during their purchase as well as working in a well-illuminated environment with the temperature well - adjusted to promote adequate muscular blood circulation are all effective practices that could encourage the prevention of these disorders.[15-20]

Ergonomics can also reduce overexertion injuries by replacing manual patient handling with safer methods as well as adequate workplace redesign[14].

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Workplace physical redesign must be matched by acceptable worker practices. Because the work is variable and requires behavioral coordination between HCWs and their patients, healthcare work is a particularly difficult context in which to implement ergonomic concepts. Many patients/residents (especially in nursing homes) are completely dependent on professionals to participate in daily living activities such as dressing, washing, general caretaking, and toileting. Each of these activities requires a variety of postures to deal with or transport patients/occupants, which may result in the development of MSDs. These MSDs increase injury expenses, raise attrition rates, increase the number of sick days, and create personnel shortages.[21-23]

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1.2 STATEMENT OF THE PROBLEM

The multiplying effects of ergonomic hazards among providers of health care include economic loss, physical loss, and psychological disorders such as depression and stress. Consequently, these have an overall negative effect on the employees, their families, and the nation at large[24].

Some of the negative effects include musculoskeletal disorders, increased stress, reduced productivity, and decreased quality of care among healthcare workers and these issues extend to their families, causing emotional and financial strain, and reducing quality of life. Nationally, they result in economic costs, strain on the healthcare system, public health implications, and decreased workforce morale, ultimately impacting the efficiency and effectiveness of healthcare delivery.

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Annually an estimated 130 million peoples visit healthcare physicians including outpatient, hospital and emergency rooms as a result of musculoskeletal disorders gotten from ergonomic cause.[25] The burden of work-related musculoskeletal disorders globally has wide impact. The WHO estimates that 50–70% of workers develop WRMSDs and musculoskeletal illnesses

constitute the biggest contributor to years lived with disability (YLDs). Worldwide, about 1.71 billion people suffer from musculoskeletal disorders and one in two people in the United States, live with painful musculoskeletal disorders.[26,62]

Work-related musculoskeletal disorders are responsible for morbidity, lowering the quality of the workers' life and reducing productivity in many working populations. Work-related musculoskeletal disorder affecting health care providers should never be treated lightly and is the most expensive form of work-related disabilities attributing to about 40% of all costs towards the treatments.[27]

Globally, the costs of occupational harm can reach up to 2% of health spending, while subsequent patient harm can account for up to 12% of health spending, this further highlights the multiplier effect of occupational harm among healthcare workers.[28]

According to an estimate, one third of all cases of sick leave among health care employees are due to musculoskeletal disorders[29]. The other burdens of musculoskeletal disorders can be loss of productive life years and societal burden due to functional limitations.

There is substantial literature to confirm that health care professionals are susceptible to sustaining musculoskeletal disorders during the course of their work routine especially those who are in direct contact with patients[30,31].

Specifically, high prevalence rates of WRMSDs have been reported among nurses[31-34]. There are also reports on high prevalence of WRMSDs among other hospital workers[46,47,51] This is especially significant in Nigeria, where the health sector faces challenges including high manual work demands and insufficient staffing due to a low number of trained health professionals relative to the population and severe brain drain[31,33,37]. A survey conducted on the prevalence of

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WRMSDs among nurses from three selected hospitals in Nigeria in 2016 revealed that 84% of the nurses have had WMSDs once or more in their occupational lives. The 12-months period and point prevalence rate of WMSDs at any region of the body was 78% and 66.1% respectively.[31]

Lower back pain constitutes the highest burden globally among the musculoskeletal disorders with a prevalence of 568 million people[62]. Surgeons are especially vulnerable to low back pain with 70–85% of surgeons suffering from low back pain in their lifetime[38]. Chronic low back pain in surgeons was associated with detrimental consequences for their professional activities, potentially compromising surgical outcomes, quality patient care, and the surgeon's quality of life[39].

Healthcare workers face significant physical demands on the job. They are required to transfer patients, lift heavy objects, stand for long periods, perform repetitive movements, and maintain uncomfortable postures. [40,41] These activities have been linked to musculoskeletal disorders as possible risk factors leading to chronic pain, reduced mobility, and long-term disability, which can ultimately impact their ability to work and their overall quality of life.

1.3 JUSTIFICATION OF THE STUDY

Medical professionals are at a higher risk of work-related musculoskeletal disorders, a relatively under-researched area in our country that presents significant health and socioeconomic challenges for healthcare workers. The World Health Organization and International Labour Organization regard Work related musculoskeletal disorders as new epidemic that should be researched and solved[42] and to apply intervention firstly, the prevalence, types and risk factors among health care workers should be understood.

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Given the problem's potential to diminish work efficiency and the overall well-being of healthcare workers, and the lack of published data confirming these issues at the University of Benin Teaching Hospital (UBTH) in Edo State, Nigeria, conducting this research has become necessary.

This study will provide the missing epidemiological data on the need to apply ergonomics in clinical practice, addressing the vulnerabilities that healthcare practitioners are exposed to. It would also provide a stimulating effect capable of spurring required agencies of government into action that ensures the optimal maintenance of the health and efficiency of her medical personnel. It is, thus, necessary to conduct this study to determine the types and prevalence of musculoskeletal disorders, ergonomic risk factors and coping strategies adopted by healthcare workers for musculoskeletal disorders in UBTH.

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1.4 RESEARCH QUESTIONS

1. What is the prevalence of musculoskeletal disorders among healthcare workers in the University of Benin Teaching Hospital?
2. What are the types of musculoskeletal disorders among healthcare workers in the University of Benin Teaching Hospital?
3. What are the ergonomic risk factors associated with musculoskeletal disorders among healthcare workers in the University of Benin Teaching Hospital?
4. What are the coping strategies and treatment options adopted by healthcare workers in the University of Benin Teaching Hospital?

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1.5 AIMS AND OBJECTIVES

1.5.1 General Objective

To investigate the prevalence and types of musculoskeletal disorders, ergonomic risk factors and coping strategies adopted by healthcare workers in University of Benin Teaching Hospital, with a view to recommend the implementation of ergonomic preventive measures in healthcare practice.

1.5.2 Specific Objectives

1. To determine the prevalence of musculoskeletal disorders among healthcare workers in the University of Benin Teaching Hospital.
2. To identify the types of musculoskeletal disorders among healthcare workers in the University of Benin Teaching Hospital.
3. To identify the specific ergonomic risk factors contributing to these disorders among healthcare workers in the University of Benin Teaching Hospital.
4. To assess the coping strategies and treatment options adopted by healthcare workers in the University of Benin Teaching Hospital.

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LITERATURE REVIEW

2.1 PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG HEALTHCARE WORKERS

A study was conducted among healthcare workers in five hospitals located in Faisalabad, Pakistan, with the objective of assessing the prevalence of work-related musculoskeletal disorders. A previously used validated questionnaire, which consisted of four sections, including demographic information, occupational health questions, and associated occupational risk factors and coping strategies, was used as a survey tool to collect data on 1469 health workers. The findings of this study revealed that 7-day and 12-month prevalence rates of WMSDs were 1226 (83.45%) and 1107 (75.35%) respectively among HCWs and most common WMSDs was low back pain 576 (39.2%) followed by the neck 217 (15%) and ankles 186 (13%) according to body sites.[47]

A systematic review was done to determine the overall prevalence rate of WRMSD among dentists, physiotherapists, and surgeons and also identify the commonly affected regions of the body about specific health care professions among each of the three professions, as recorded by the cross-sectional studies performed in various countries and regions of the world. A systematic search strategy was framed following the PRISMA guidelines based on the present inclusion and exclusion criteria. A critical search of articles was conducted during June 2020 in CINAHL (DOAJ), PubMed, Google Scholar Scopus, PEDro databases and SAGE journals. Out of the 42 articles that met the eligibility criteria, there were 39 cross-sectional studies, 2 pilot cross-sectional surveys and 1 prospective cohort study with one-year follow-up. All studies included in this review used various survey tools for recording the demographic details and measuring the prevalence of WRMSDs and other outcome factors. The study concluded that all three health

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Deleted[ASUS]: The probability of developing WRMSDs was higher among physiotherapists (OR = 3.63, 95% CI: 1.39-9.51), participants with rank 18 (OR = 4.17, 95% CI: 2.18-7.96), and HCWs who work in primary care (OR = 8.94, 95% CI: 3.47-23.04)

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care professionals (dentists, physiotherapists and surgeons) are highly prone to develop WRMSDs with surgeons and dentists being more vulnerable when compared to physiotherapists. The lower back and neck are identified as the two most commonly affected regions among all three professionals.[48]

A cross-sectional study was conducted at Parirenyatwa Group of Hospitals (PGH) in Harare, Zimbabwe with the aim of determining the prevalence, consequences and factors associated with WMSDs among registered general nurses. Stratified proportional random sampling was then used to select 208 nurses in the various wards. The questionnaire was largely researcher-developed and had few adopted questions from the Nordic Musculoskeletal Questionnaire (NMQ) and was self-administered. Data was analyzed using Statistica version 13.2. The lifetime prevalence of WMSDs in nurses was 95.7% (n = 112). The first episodes were experienced in the first 5 years of working (n = 59, 52.7%). However, 82.1% (n = 96) nurses experienced WMSDs in the last 12 months. Low back pain was the most common WMSDs reported (n = 55, 67.9%). However, the study was conducted at one public hospital in Harare, Zimbabwe and this affects the generalizability of the results to nurses outside Parirenyatwa Group of Hospitals.[49]

A survey was conducted on prevalence, work factors and coping strategies of WMSDs among nurses in Nigeria in 2016. Respondents for the study were nurses in active service from three selected hospitals in Ibadan namely; University College Hospital, Federal government owned hospital; Adeoyo General Hospital, a state government owned hospital and Oluyoro Catholic Hospital, a private owned hospital. A previously validated self-administered questionnaire which sought information on demographics, prevalence and pattern of WMSDs, associated job risk

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factors and coping strategies was employed as the survey instrument. A total of 160 questionnaires were distributed to nurses in the different hospitals but 128 questionnaires were returned yielding an 80% response rate. Ten of the returned questionnaires were excluded because of incomplete data. The findings revealed that 84% of the nurses have had WMSDs once or more in their occupational lives. The 12-months period and point prevalence rate of WMSDs at any region of the body was 78% and 66.1% respectively. Nurses with more than 20 years of clinical experience are about 4 times more likely to develop WMSDs (OR 3.81; CI 1.08-13.4) than those with 11-20 years of experience.[50]

A cross-sectional survey was conducted in 2019 among 135 nurses (126 females and 9 males) in tertiary, secondary, and private hospitals in Lagos state. Two validated standard self-administered questionnaires were used and the instruments captured information on personal characteristics, and reported on WMSDs and work ability using the Modified Standard Nordic Musculoskeletal Questionnaire and Work Ability Index (WAI). The point and 12-month prevalence of WMSDs was 95 (70.4%) and 81 (60%) among respondents, respectively.[51]

2.2 TYPES OF MUSCULOSKELETAL DISORDERS AMONG HEALTHCARE WORKERS

A descriptive cross-sectional study was conducted among 200 health care workers employed at five government and private HCFs in Lahore, Pakistan in 2018 to determine occupational health and safety hazards with special focus on ergonomic hazards among healthcare facility workers. The respondents included doctors, nurses, laboratory attendants, pharmacists, x-ray technicians and hospital sanitary workers. Using an online calculator, a sample size of 200 healthcare workers was determined from a total population of over 3,000, with a margin of error under 7% and an 86% confidence level. Majority of the respondents faced a range of ergonomic hazards in

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which muscle aches/muscle sprains (76.5%), elbow/wrist/neck pain (56.0%), problems of body posture (56.0%), excessive stretching of muscles (67.5%), bending/twisting at work (55.5%) were the most reported. Other ergonomic hazards included carpel tunnel syndrome (27.0%), chronic back pain (46.5%), hamstring pain (26.0%), injury due to fracture (22.5%) and lifting heavy loads of work (50.0%).[43]

A multi-center cross-sectional study was conducted in 2019 to estimate the prevalence of musculoskeletal disorders among 236 hospital radiologists (public, private, and academic) in major cities of the Eastern Province of Saudi Arabia via an online survey. The Nordic Musculoskeletal Questionnaire was used to assess musculoskeletal disorders, and the study outcomes were based on the presence of debilitating musculoskeletal disorders-related symptoms in any area of the body. Musculoskeletal disorders-related symptoms varied in accordance with the affected body area. Within the 7 days prior to the study, many participants reported lower back (42.4%), neck (40.9%), or shoulder (32.3%) symptoms. Almost one-fourth (24.7%) of the participants had pain in the wrist/hand during the same period, however, the musculoskeletal disorders that prevented the participants from performing normal activities in the 12 months preceding the study showed a slightly different pattern, with neck pain being the most common symptom (15.2%)[63]

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A comparative cross-sectional study was performed at a tertiary centre at King Abdulaziz University Hospital (KAUH) Jeddah, Saudi Arabia where full-time registered nurses from four different departments were selected for analysis between September 1, 2011 and February 29, 2012. MedCalc statistical software was used to estimate a sample size of 200, which represents 20% of the working staff and using a simple random method, 200 nurses were selected from

different hospital departments from a list of names obtained from the hospital administration and were interviewed by the researcher to complete a written questionnaire. Musculoskeletal symptoms over the past year were assessed using the Nordic Standardized Musculoskeletal Questionnaire. In addition to demographic questions, the researcher evaluated employment history, physical risk factors at work, and general health status. In this study, approximately 85% of the nurses reported experiencing at least one musculoskeletal symptom. Musculoskeletal symptoms occurred most commonly in the lower back (65.7%), ankles and feet (41.5%), and shoulders (29%). Symptoms of the wrist (10%), mid-back (5%), and elbow (3%) were the least common.[44]

A cross-sectional study was done to investigate the pattern of WRMSDs among hospital workers in Osun State, South-West, Nigeria in 2016. A total of 769 hospital workers participated in this descriptive study, yielding a response rate of 75.8%. However, only 742 questionnaires were found valid and used in the final analysis. The survey tool used in this study was a combination of the Nordic Questionnaire and a self-developed occupational health proforma. Data was analyzed using descriptive statistics of mean, percentage and frequency. The results showed that low back (61.1%) was the worst hit anatomical region, followed by neck (43.4%), shoulder (32.1%), and upper back (31.5%), while the elbow (12.7%) was the least affect body site.[45]

Another cross-sectional study was done in 2011 to investigate the prevalence and pattern of WMSDs among health workers in Obafemi Awolowo University Teaching Hospitals complex, Ile-Ife, Nigeria. An adapted questionnaire from the Nordic musculoskeletal questionnaire was used as the survey instrument. A total of 200 questionnaires were distributed and only 182 were returned and found to be valid for the data analyses yielding a response rate of 91%. WMSDs

reported mostly for low back (50%) followed by the shoulders (27.5%) and knees (18.1%) but least in the ankles (4.9%).[46]

2.3 ERGONOMIC RISK FACTORS

A multi-city study was conducted among medical staff in China concerning the risk factors of work-related musculoskeletal symptoms (WMSs). They investigated the prevalence of work-related musculoskeletal symptoms among medical staff and evaluated the associations of different levels of adverse ergonomic factors with WMSs. A total of 6099 Chinese medical staff were asked to complete a self-reported questionnaire (face-to-face one-to-multiple questionnaire) to assess the prevalence and risk factors of WMSs from June 2018 to December 2020.

A prevalence rate of 57.5% was observed for WMSs among overall medical staffs, which mainly affected the neck (41.7%) and shoulder (33.5%). 'Keeping sitting for long hours very frequently' (OR = 1.26, 95% CI: 1.04, 1.53) was positively associated with WMSs in doctors, while 'keeping sitting for long hours occasionally' (OR = 0.91, 95% CI: 0.85, 0.97) was identified as a protective factor of WMSs in nurses. The associations of adverse ergonomic factors, organizational factors, and environmental factors with WMSs were different among medical staff in different positions.[52]

A cross-sectional study was conducted on 1179 nurses working in 15 district hospitals in Haiphong city, Vietnam to determine the prevalence and associated factors of musculoskeletal disorders using the Standardized Nordic Questionnaire. When analyzing factors related to MSDs, the results showed that women were 2.1 times more likely to develop MSDs than men; people

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with a previous history of MSDs were more likely to develop MSDs symptoms in the past 12 months than those with no history (OR = 7.1); nurses with symptoms of psychological distress and frequent absenteeism in the workplace had a higher prevalence of MSDs compared to the rest (p<0.001).[53]

A cross-sectional study conducted at Hospital Sultan Abdul Halim (HSAH), Sungai Petani Kedah, Malaysia in 2021 with the aim of estimating the prevalence and determining risk factors of MSD pain in various anatomical regions among nurses. The sampling frame for the study was drawn from all female registered nurses working in normal in-patient wards. Convenience sampling was used after obtaining informed consent and a self-administered questionnaire was given to registered nurses with clinical experience. The results were drawn from a total of 300 nurses. Almost all (97.3%) the nurses complained of having work-related pain during the last 12 months. The frequency of having musculoskeletal symptoms in any body region was increased with age, lower education level, female gender, high BMI, job tenure and lifestyle.[54]

An Institution-based cross-sectional study was conducted to assess the prevalence and factors associated with work-related musculoskeletal diseases among health care providers working in the operating room of University of Gondar comprehensive specialized hospital and Tibebe Ghion comprehensive specialized hospital, North West Ethiopia from April to May, 2021. Purposive sampling was used to select the study participants and the study was conducted on 394 healthcare providers. Data were collected through a self-administered questionnaire using the standard Nordic Musculoskeletal Questionnaire. In multivariate logistic regression analysis; working overtime [AOR:1.74; 95% CI (1.05, 2.86)], previous history of MSD [AOR:6.85; 95%CI:(1.91, 22.7)], being diploma holder [AOR:5.27; 95% CI (1.12, 24.68)], being 1st degree holder [AOR:2.65; 95% CI (1.11, 6.28)], absence of assistance during procedures [AOR:1.73;

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95% CI (1.02, 2.85)], and working in night shifts [AOR:1.72; 95% CI (1.08, 2.74)] were significantly associated with work related musculoskeletal disease among health care providers working in operation room.[55]

A cross-sectional survey was conducted to assess the pattern and predictors of musculoskeletal disorders among employees of Federal Medical Centre Abeokuta Ogun State Nigeria. They completed a questionnaire on the perceived presence of ergonomic hazards at their work stations and the standardized Nordic questionnaire. Descriptive and inferential statistical test were used to analyze the data. The results revealed that; 71.9% of the respondents reported WMSDs with lower back, upper back and the neck being the three most affected areas. Prolonged standing (53.1%) and prolonged sitting (40.8%) were the most prevalent perceived ergonomic hazard among the respondents. Forceful exertion was the factor that has the highest estimated relative risk of causing musculoskeletal pain over a 12 month period (OR = 4.8), followed by prolonged standing (OR = 2.7), and frequent bending (OR = 2.6)[56]

2.4 COPING STRATEGIES AND TREATMENT OPTIONS

In November 19, 2017, a cross-sectional study was conducted at the university hospital in the Alexandria faculty of nursing, incorporating five main units namely, Medical Intensive Care Unit (MICU), Cardiac Care Unit (CCU), Neuro Intensive Care Unit (NICU), Surgical Intensive Care Unit (SICU) and the Outpatient Department (OPD) and also at nursing school. A total sample of 300 was calculated based on the population size 450, and precision of 5% (delta). The study tool was formulated according to the latest review of related literatures. A four section questionnaire was employed as the survey instrument.

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Results revealed that the usage of different part of body by the nurses as a coping mechanism during the nursing procedures (34.0%) and change of posture (30.0%) were the top two statistically significant coping strategies employed.[57]

A Cross-sectional study was conducted in 2016 to assess the prevalence, job risk factors and coping strategies of Work-Related Musculoskeletal Disorders among Physiotherapists working in Surat City, Gujarat state, India. The list of Physiotherapists was collected from the Medical Directory of South Gujarat and a semi structured questionnaire adopted from questionnaires used for similar studies around the world was circulated to 314 Physiotherapists. A total of 271 questionnaires were received back with a response rate of 86%. Mean, standard deviation, frequency, percentage and chi square test were used for data analysis. The common coping strategies adopted by respondents were: modifying positions of patient and self (54.1%), adjusting height of treatment surface (47.1%) and selection of techniques that does not aggravate or provoke discomfort (41.8%).[58]

A cross sectional study was conducted in Lagos, Nigeria in 2019 among nurses from selected teaching, general, and private hospitals. The survey was conducted with 135 nurses (126 females and 9 males) using a closed-ended structured questionnaire, drafted and modified from the short standardized and validated Nordic Musculoskeletal Questionnaire (NMQ). This study identified the top three coping strategies to reduce the risk of work-related musculoskeletal disorders (WMSDs) as: seeking assistance in managing heavy patients (48.10%), modifying nursing procedures to avoid stressing an injury (43.70%), and adjusting the nurse's position (42.20%).[51]

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A survey was conducted on prevalence, work factors and coping strategies of WMSDs among nurses in 3 hospitals in Ibadan, Nigeria in 2016. A previously validated self-administered questionnaire which sought information on demographics, prevalence and pattern of WMSDs, associated job risk factors and coping strategies was employed as the survey instrument. A total of 160 questionnaires were distributed to nurses in the different hospitals with a response rate of 80% response rate. Findings revealed that getting help in handling heavy patients (50.4%), modification of nursing procedures in order to avoid re-injury (45.4%), and modifying patient's/nurse position (40.3%) were the top three coping strategies indicated by the respondents in ameliorating the risk of WMSDs.[50]

METHODOLOGY

3.1 STUDY AREA

This study was carried out in University of Benin Teaching Hospital (UBTH) in Egor Local Government Area of Benin City, the capital of Edo State, Nigeria. Edo State is one of the six states in the south-south geopolitical zone of Nigeria. Edo State has a total of eighteen local government areas and has a land mass of about nineteen thousand, seven hundred and forty-three square kilometres (19,743sqkm) which is bounded by Ondo and Ekiti states to the west, Kogi state to the North-East, and Delta state to the South. Its population estimate as at 2024 is 4,921,058 (projected) using a growth rate of 2.8% per year.

Benin City is largely made up of three (3) Local Government Areas namely; Egor, Oredo, and Ikpoba-Okha. Egor Local Government Area was carved out of the old Oredo LGA in October 1996 with its headquarters at Uselu. The predominant occupations in Edo State are civil servants, artisans and farming.[59,60]

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The University of Benin Teaching Hospital (UBTH) is a multi-specialty healthcare service provider located in Ugbowo, Benin City, Edo State, Nigeria. It was established on May 12, 1973, following the enactment of an edict (number 12) of the Nigeria National Health Act. The hospital is affiliated with the University of Benin, Nigeria, and is involved in the training of high and middle-level manpower for the health industry The University of Benin Teaching Hospital is at Ugbowo in Ovia-North-East Local Government Area and located on latitude 6°23'26" N and longitude 5°36'44" E along KM 8, Benin-Lagos Expressway. The hospital is under the current leadership of Prof. Darlington E. Obaseki as Chief Medical Director. The University of Benin Teaching Hospital is a 892-bedded facility that renders promotive, preventive, curative, and rehabilitative services in various departments. UBTH also offers primary healthcare at the Comprehensive Health Centres in the rural communities of Ogbona and Udo, both in Edo State. The clinical departments of UBTH are broadly divided into 25, with several specialties in these clinical departments rendering optimal healthcare.[60,64]

3.2 STUDY DESIGN

A descriptive cross-sectional study design will be utilized for this study.

3.3 STUDY POPULATION

This study will be carried out among Health Care Workers in University of Benin Teaching Hospital (UBTH) in Egor LGA, Benin City, Edo State.

3.4 SELECTION CRITERIA

3.4.1 Inclusion criteria

Deleted[ASUS]: Egor LGA is bounded to the north by Isiohor in Ovia North-East Local Government, to the south by Ikpoba-Okha LGA and to the East by Oredo LGA. Administratively, Egor LGA is divided into ten (10) wards which include Ward 1 (Evbotubu), ward 2 (Evbunogide), ward 3 (Useh), ward 4 (Egor), ward 5 (Uwelu), ward 6 (Evbareke), ward 7 (Uselu 1), ward 8 (Uselu 2), ward 9 (Okhoro), and ward 10 (Ugbowo). The major towns are Uselu, Evbotubu, Ugbowo and Okhoro. The local government has ten (10) villages including: Aiuibiye, Uriomwon village 1&2, Okhokugbo, Iguikpe, Ugbioghako, Agbodo, Esesoyan, Ivbiyeneva and Iguedayi.[1]

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Deleted[ASUS]: **Egor Local Government Area has a population of three hundred and thirty three thousand, eight hundred and ninety-nine people and it is the most densely populated Local Government Area in Edo state with a population of 4,777,000. The dominant tribe is Benin: however there is a large population of non-indigenes. The major means of communication is Bini language and Pidgin English.[1]**

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1. Participants comprising of doctors, nurses, pharmacists, medical laboratory scientists and physiotherapists who were available at the time of the study
2. Participants comprising of doctors, nurses, pharmacists, medical laboratory scientists and physiotherapists who were willing to participate in the study and give verbal consent.

3.4.2 Exclusion criteria

1. Participants with current musculoskeletal trauma.
2. Participants who were too ill to participate in the study.

3.5 DURATION OF THE STUDY

The study was carried out within one 12-month period, from July 2023 to July 2024.

· Conceptualization and initial write-up: 6 months

· Data collection: 4 months

· Analysis: 1 month

· Final write-up: 1 month

3.6 SAMPLE SIZE DETERMINATION

The minimum sample size was calculated using the Cochran formula for descriptive study.

$n = Z^2pq/d^2$

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Where,

n= minimum sample size

Z= standard normal deviate at 95% confidence level (1.96)

Using a p of 70.4% for prevalence of musculoskeletal disorders based on a study conducted in several hospitals in Lagos.[51]

p= 0.704

q=1.0-p

q=1.0-0.704= 0.296

d= degree of precision (at 95% confidence interval)

$Z^2 = 1.96^2 = 3.8416$

$d^2 = 0.0025$

$$n = \frac{3.8416 \times 0.704 \times 0.296}{0.0025}$$

n= 320

the minimum sample size is 320

However since the population under this study was less than 10,000 sample adjustment was done using the formula;

$n_f = n_0/(1+[\{n_0-1\}/N])$

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Where;

n_f= desired sample size when population is less than 10,000

n_0= estimated sample size= 320

N= total population of healthcare workers in UBTH

N = 4,022

n_f = 320/(1+[{320-1}/4022])

n_f = 320/(1+0.07931377)

n_f = 320/(1.07931377) = 296.484682= 296

With an attrition rate of 10%; i.e 296/0.9=328.8=329

The final minimum sample size is, therefore, 329.

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3.7 SAMPLING TECHNIQUE

A stratified random sampling technique was used to select healthcare workers that participated in the study:

STEP 1: Definition of Population

The sample population is healthcare workers in University of Benin Teaching Hospital, Benin City, Edo State.

There are a total number (N) of 4,022 healthcare workers in the University of Benin teaching hospital

STEP 2: Identifying the strata

Healthcare professionals were segmented into distinct strata based on their respective roles, encompassing doctors, nurses, pharmacists, medical laboratory scientists and physiotherapists constituting a total of 1,690 healthcare workers.

STEP 3: Determination of sample size for each stratum

The allocation of the total sample size to each stratum was based on the proportion of workers in each category relative to the total number of healthcare workers to be considered.

To derive the number of healthcare workers to be recruited per stratum, we used the relationship

$R_x = n_x / N$,

where R_x = proportion of healthcare workers to be recruited into the study from 'x' strata

N = Sum total of healthcare workers = 1,690

n_x = population of healthcare workers from 'x' strata

where x= Doctors, n_x= 739

R= 739/1,690= **0.437**

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where x= Nurses, n_x= 794

R= 794/1,690= **0.470**

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where x= Pharmacists, n_x= 31

R= 31/1,690= **0.018**

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where x= Medical Laboratory scientists, n_x= 110

R= 110/1,690= **0.065**

where x= Physiotherapists, n_x= 16

R= 16/1,690= **0.009**

The specific number of HCWs to be recruited per strata, s_x, will be derived using the formula:

$s_x = R_x \times S$,

Where R_x = proportion of healthcare workers to be recruited into the study from 'x' strata

S = Minimum sample size for the study = 329

Where x = Doctors, R_x= 0.437

s_x = 0.437 x 329 ≈ **144**

Where x = Nurses, R_x= 0.470

s_x = 0.470 x 329 ≈ **155**

Where x = Pharmacists, R_x= 0.018

s_x = 0.018 x 329 ≈ **6**

Where x = Medical Laboratory scientists, R_x= 0.065

s_x = 0.065 x 329 ≈ **21**

Where x = Physiotherapists, R_x= 0.009

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$s_x = 0.009 \times 329 \approx \mathbf{3}$

Therefore, 144 doctors, 155 nurses, 6 pharmacists, 21 medical laboratory scientists and 3 physiotherapists will be selected, the sum of which makes the final sample size of 329 healthcare workers.

STEP 4: Random sampling of participants from each stratum

A comprehensive list of healthcare workers within each stratum will be compiled from employee records. Subsequently, a random sampling method will be utilized to select individuals within each stratum, ensuring an equal chance of selection for every individual.

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3.8 DATA MANAGEMENT

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3.8.1 TOOLS FOR DATA COLLECTION

The tool used for the survey was a structured self-administered questionnaire. This questionnaire was modified using information from literature reviews and previous studies on Assessment of ergonomics among healthcare workers and the Nordic musculoskeletal Questionnaire. The questionnaire covered the set objectives for the study which are broadly divided into sections.

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SECTION A: General Information

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This section seeks answers concerning respondents' demographics including age, sex, marital status, ethnic group, religion, department and specialty, as well as years in current occupation, working hours per week.

SECTION B: To identify the prevalence and types and of musculoskeletal disorders among healthcare workers in UBTH in the last 12 months and 7 days, a symptom survey tool prepared

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from Musculoskeletal Discomfort Form (Based on the Nordic Questionnaire) will be used used.[64] It shows a tabular representation of nine anatomic areas which are the neck, upper back, lower back shoulders, elbows, wrists/hands, hips/thighs, knees, and ankles/feet and enquires about the existence of any troubles (pain and discomfort) during the last 12 months and 7 days prior to the study.

SECTION C: To identify the Ergonomic risk factors

SECTION D: To identify the coping strategies and treatment options adopted by healthcare workers

3.8.2 METHOD OF DATA COLLECTION

The questionnaire was self-administered to the selected respondents after an informed consent was obtained from the participants.

3.9 PRE-TESTING

The questionnaire was pretested among health care workers in Central Hospital, Benin City. Ten percent of the sample size (36 questionnaires) were used for pretesting. The aim was to test the questionnaire for correctness and appropriate understanding by the respondents to aid appropriate collection of data. Appropriate corrections were made where applicable before commencement of this survey.

3.10 DATA ANALYSIS, SCORING AND MEASUREMENT OF VARIABLES

3.10.1 SCORING AND MEASUREMENT OF VARIABLES

Prevalence and Types of musculoskeletal disorders

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The prevalence of musculoskeletal disorders was assessed and scored using Nordic musculoskeletal questionnaire. The NMQ was constructed for screening for musculoskeletal disorders in an ergonomic context, in which the human body (viewed from the back) is divided into nine anatomical regions. These regions were selected on the basis of two criteria: regions where symptoms tend to accumulate, and regions which are distinguishable from each other both by the respondent and a health surveyor and they are evaluated for musculoskeletal disorders.[64]

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Components of the NMQ Scoring system

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The NMQ scoring system comprises two sections for each body region; Prevalence of discomfort in the last 12months and in the last 7days. The symptom prevalence score scale is as follows;

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12-Month Prevalence: Scored as 1 (Yes) or 0 (No) for each body region.

7-Day Prevalence: Scored as 1 (Yes) or 0 (No) for each body region.

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For each body region, the total score is calculated by summing the scores for the 12-month prevalence and 7-day prevalence. The maximum possible score for each body region is 2, indicating:

- Presence of symptoms in the past 12 months (1 point)
- Presence of symptoms in the past 7 days (1 point)

The prevalence of musculoskeletal symptoms for each body region is calculated by summing the scores and expressing them as a percentage of the total number of participants. The prevalence is then calculated separately for the 12-month and 7-day periods.

Risk factors

The risk factors were assessed using twelve (12) variables from six (6) questions. Points were allocated to the risk factors based on the respondents' answers with "never" having a score of 0, while "always" will have the highest score of 4. For the hours per day of prolonged standing, a score of 1 were given to answers more than 1 hour while a score of zero for less than 1 hour.[65] For the hours per day of prolonged sitting, answers more than 2 hours were given a score of 1 while a score of 0 was given to answers less than 2 hours.[66] The scores were summed up and converted into percentages. Those with scores 0-49 percent were regarded as not being at risk while those with scores from 50% and above were at risk of ergonomic hazards.

3.10.2 DATA ANALYSIS

Data collected was collated, screened for completeness, numbered serially and entered into IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows, Version 27.0.1 software.

Univariate analysis was done to assess the distribution of variables. For categorical variables, data will be expressed as means and standard deviations, and for numerical ones, frequency and percentage will be used. Bivariate analysis was done to determine the association between socio-demographic characteristics (categories of healthcare workers, years of experience) and primary and secondary outcome variables – presence of musculoskeletal disorders as well as the ergonomic risk factors. The chi-square test was used to determine associations between categorical variables and the fishers exact test will be used in situations where more than 20% of

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the cells have an expected count less than 5. Independent t-test was used to compare means of major outcome variables.

Multivariate analysis using binary logistic regression analysis was done to identify predictors of WRMSDs among health care workers. Finally, variables with $p < 0.05$ in the final logistic model were considered statistically significant and the strength and direction of association were measured by adjusted odds ratio (AOR) with a corresponding 95% confidence interval. Results obtained were presented using prose, contingency tables and charts.

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3.12 ETHICAL CONSIDERATIONS

Ethical approval for this study was obtained from the Research and Ethics Committee (REC), in University of Benin Teaching Hospital with permission from the Head of Department of Public Health and Community Medicine, School of Medicine, College of Medical Sciences, University of Benin. Informed consent was also taken from the respondents before administering the questionnaires and participants were given assurances that their participation in the survey will be voluntary, and they have the freedom to withdraw at any point without facing any negative consequences. They were also be guaranteed of the confidentiality of their responses, ensuring that their identity and individual answers would be kept private and anonymous.

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3.13 STUDY LIMITATION

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A limitation in the study is that the data was self-reported and therefore exposed to recall bias. This limitation was overcome by providing clear instructions to respondents on how to answer

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the questions correctly, emphasizing on the importance of recalling specific details. Also, the use of shorter recall period of symptoms experienced in the past year and week, and employing a questionnaire design specific and having clear questions to avoid confusion, helped address the limitation.

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Deleted[Ukalike]: It is also possible that some of the respondents in our study perceived their musculoskeletal disorders as WRMSDs regardless of whether they were caused by work or not. Adegoke et al[37] posited that work may only be a contributory factor in the development of musculoskeletal disorders among workers and that distinguishing between WRMSDs and general musculoskeletal disorders can be challenging since their consequences in response to work demands may be similar.

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RESULTS

A total of 329 respondents participated in this study with a response rate of 100%. The results are presented as follows:

Section A: Socio-demographic characteristics of respondents

Section B: Prevalence and types of musculoskeletal disorders

Section C: Ergonomic risk factors

Section D: Coping strategies and treatment options

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

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TABLE 1: Socio-demographic Characteristics of Respondents

Variables	Frequency (n = 329)	Percent (%)
Age Group (years)		
18-29	206	62.6
30-39	93	28.3
40-49	26	7.9
≥ 50	4	1.2
Mean (SD) = 29.17±6.84 years		
Sex		
Male	124	37.7
Female	205	62.3
Marital status		
Single	57	71.1
Married	369	28.6
Separated	1	0.3
Religion		
Christianity	314	95.4
Islam	13	4.0
African Traditional Religion	2	0.6
Ethnicity		
Benin	103	31.3
Igbo	84	25.5
Esan	72	21.9
Yoruba	26	7.9
Urhobo	16	4.9
Etsako	12	3.6
Hausa	8	2.4
Ijaw	5	1.5
Isoko	2	0.6
Igala	1	0.3

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The socio-demographic characteristics of the respondents reveal that the majority, 206 (62.6%), were between the ages of 18 and 29 years, with a smaller percentage, 93 (28.3%), in the 30-39 age group. A total of 26 (7.9%) respondents were aged 40-49, while only 4 (1.2%) were aged 50 and above. The mean age of the respondents was 29.17 years with a standard deviation of 6.84.

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In terms of sex, 205 (62.3%) of the respondents were female, while 124 (37.7%) were male.

Regarding marital status, most respondents, 369 (71.1%), were married, while 57 (28.6%) were single. Only 1 (0.3%) respondent reported being separated.

The majority of the respondents, 314 (95.4%), identified as Christians, followed by 13 (4.0%) who practiced Islam, and 2 (0.6%) who adhered to African Traditional Religion.

In terms of ethnicity, the largest group was Benin, with 103 (31.3%) respondents, followed by Igbo with 84 (25.5%), and Esan with 72 (21.9%). Other ethnic groups represented included Yoruba, Urhobo, Etsako, Hausa, Ijaw, Isoko, and Igala, with smaller proportions ranging from 7.9% to 0.3%.

TABLE 2: Occupational Characteristics of Respondents

Variables	Frequency (n = 329)	Percent (%)
Category of Healthcare worker		
Nurses	157	47.2
Doctors	142	43.2.2
Medical Laboratory Scientists	21	6.4
Pharmacists	6	1.8
Physiotherapists	3	0.9
Years in current occupation		
1-3 years	212	64.4
4-6 years	96	29.2
7-9 years	11	3.3
≥ 10 years	10	3.0
Working hours per week		
≤ 48 hours	102	31.0
49-96 hours	198	60.2
> 96 hours	29	8.8
Work shifts		
Yes	212	64.4
No	117	35.6

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Among the healthcare workers, the majority were nurses, accounting for 157 (47.7%) of respondents, followed by doctors, 142 (43.2%). Medical Laboratory Scientists represented 21 (6.4%) of the respondents, while pharmacists and physiotherapists made up the smallest groups, 6 (1.8%) and 3 (0.9%), respectively.

In terms of years in their current occupation, most respondents, 212 (64.4%), had worked for 1-3 years, while 96 (29.2%) had worked for 4-6 years. A smaller portion had worked for 7-9 years, 11 (3.3%), and the fewest, 10 (3.0%), had been in their current occupation for 10 or more years.

Regarding working hours per week, the majority of respondents, 198 (60.2%), reported working between 49-96 hours per week, followed by 102 (31.0%) who worked 48 hours or fewer, while only 29 (8.8%) worked more than 96 hours per week. For work shifts, most respondents, 212 (64.4%), worked shifts, while 117 (35.6%) did not

SECTION B: PREVALENCE AND TYPES OF MUSCULOSKELETAL DISORDERS

TABLE 3: Discomfort in Body Regions Among Respondents

Variables	Frequency (n = 329)	Percent (%)
Discomfort in the last 12 months		
Neck	203	61.7
Shoulders	160	48.6
Upper back	173	52.6
Elbows	52	15.8
Wrist/hands	116	35.3
Lower back	209	63.5
Hips/thighs	109	33.1
Knees	122	37.1
Ankles/feet	152	46.2
Discomfort in the last 7 days		
Neck	123	37.4
Shoulders	104	31.6
Upper back	103	31.3
Elbows	42	12.8
Wrist/hands	76	23.1
Lower back	146	44.4
Hips/thighs	76	23.1
Knees	88	26.7
Ankles/feet	89	27.1

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In the past 12 months, the most commonly reported area of musculoskeletal discomfort among respondents was the lower back, with 209 (63.5%) reporting discomfort, followed by the neck with 203 (61.7%). Discomfort in the upper back was reported by 173 (52.6%) of respondents, while discomfort in the shoulders was noted by 160 (48.6%). Other areas of discomfort included the ankles/feet, reported by 152 (46.2%), knees by 122 (37.1%), wrists/hands by 116 (35.3%), and hips/thighs by 109 (33.1%). Fewer respondents experienced discomfort in the elbows, with only 52 (15.8%) reporting it.

In the past 7 days, 146 (44.4%) of respondents reported discomfort in the lower back, while 123 (37.4%) experienced discomfort in the neck. Discomfort in the shoulders was reported by 104 (31.6%) of respondents, and 103 (31.3%) reported discomfort in the upper back. Discomfort in

the knees was reported by 88 (26.7%), while discomfort in the ankles/feet was reported by 89 (27.1%). Other areas of discomfort included the wrists/hands, reported by 76 (23.1%), hips/thighs also by 76 (23.1%), and elbows by 42 (12.8%).

TABLE 4: Prevalence and Types of Musculoskeletal Disorders Among Respondents

Variables	Frequency (n = 329)	Percent (%)
By body region		
Neck	236	71.7
Shoulders	190	57.8
Upper back	202	61.4
Elbows	74	22.5
Wrist/hands	148	45.0
Lower back	246	74.8
Hips/thighs	138	41.9
Knees	147	44.7
Ankles/feet	173	53.5
By time		
Yearly	190	57.8
Weekly	274	83.3

The prevalence and types of musculoskeletal disorders (MSDs) among respondents by body region show that the most commonly affected area was the lower back, with 246 (74.8%) of respondents reporting discomfort. Neck pain was also prevalent, affecting 236 (71.7%) respondents, followed by upper back discomfort, reported by 202 (61.4%). Shoulder pain was noted by 190 (57.8%) of respondents, and ankle/foot discomfort by 173 (53.5%).

Other areas with significant prevalence include the wrist/hands, with 148 (45.0%) of respondents experiencing discomfort, and the knees, affecting 147 (44.7%). Hips/thighs discomfort was reported by 138 (41.9%), while elbow pain was the least common, affecting 74 (22.5%) of respondents.

Regarding the time of occurrence, 190 (57.8%) of respondents reported musculoskeletal discomfort within the last 12 months, while a higher percentage, 274 (83.3%), reported experiencing symptoms in the past 7 days.

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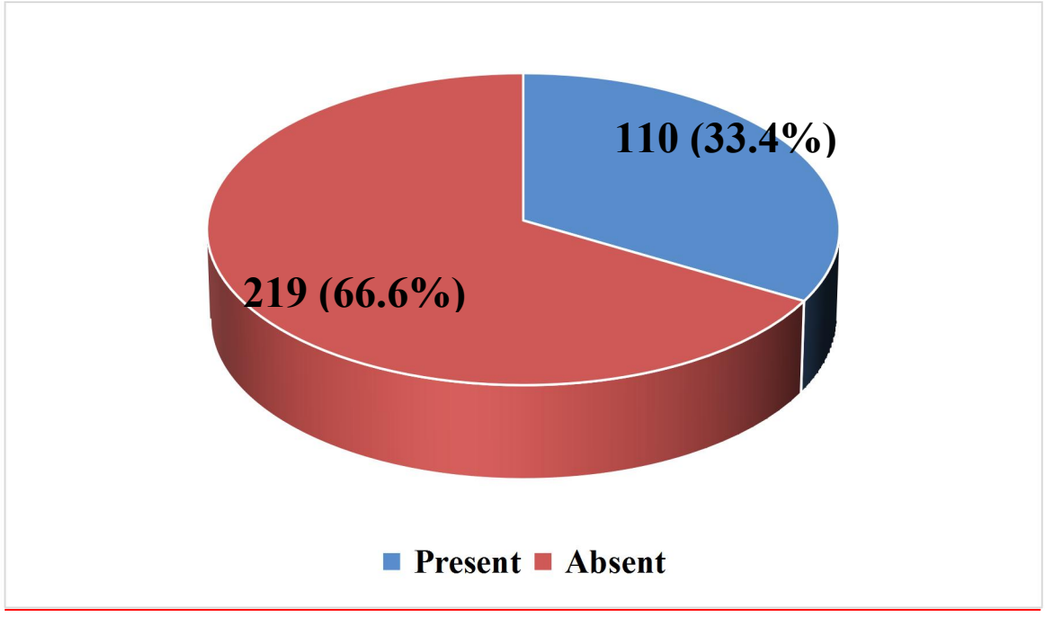

Figure 1: Prevalence of Musculoskeletal Disorders among Respondents.

About one-third, 33.4% (n=110) of the respondents had musculoskeletal disorders, while 219 (66.6%) did not

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TABLE 5: Socio-demographic characteristics and Prevalence of Musculoskeletal Disorders Among Respondents

Variables	Musculoskeletal disorder (n = 329)		Test statistic	p-value
	Present (%) 110 (33.4)	Absent (%) 219 (66.6)		
Age Group (years)				
18-29	64 (31.1)	142 (68.9)	$\chi^2 = 2.257$	0.521
30-39	36 (38.7)	57 (61.3)		
40-49	8 (30.8)	18 (69.2)		
≥ 50	2 (50.0)	2 (50.0)		
Sex				
Male	49 (39.5)	75 (60.5)	$\chi^2 = 3.307$	0.069
Female	61 (29.8)	144 (70.2)		
Marital status				
Never married	84 (35.7)	151 (64.3)	$\chi^2 = 1.972$	0.160
Ever Married	26 (27.7)	68 (72.3)		
Healthcare worker category				
Doctors	58 (40.8)	84 (59.2)	$\chi^2 = 0.121$	0.115
Nurses	44 (28.0)	113 (72.0)		
Pharmacists	2 (33.3)	4 (66.7)		
Medical Laboratory Scientists	6 (28.6)	15 (71.4)		
Physiotherapists	0 (0.0)	3 (100.0)		
Years in current occupation				
1-3 years	66 (31.1)	146 (68.9)	$\chi^2 = 3.888$	0.274
4-6 years	34 (35.4)	62 (64.6)		
7-9 years	4 (36.4)	7 (63.6)		
≥ 10 years	6 (60.0)	4 (40.0)		
Working hours per week				
≤ 48 hours	36 (35.3)	66 (64.7)	$\chi^2 = 0.654$	0.721
49-96 hours	63 (31.8)	135 (68.2)		
> 96 hours	11 (37.9)	18 (62.1)		
Work shifts				
Yes	176 (83.0)	36 (17.0)	$\chi^2 = 72.513$	**<0.001**
No	43 (36.8)	74 (63.2)		

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Respondents aged 30-39 had the highest prevalence of musculoskeletal disorders at 36 (38.7%) compared to other age groups. However, the association between age and musculoskeletal disorders was not statistically significant ($\chi 2 = 2.257$; p-value = 0.521).

A higher proportion of male respondents, 49 (39.5%), had musculoskeletal disorders compared to female respondents, 61 (29.8%). The association between sex and musculoskeletal disorders was not statistically significant ($\chi 2 = 3.307$; p-value = 0.069).

Unmarried respondents had a higher prevalence of musculoskeletal disorders at 84 (35.7%) compared to married respondents, 26 (27.7%). The association between marital status and musculoskeletal disorders was not statistically significant ($\chi 2 = 1.972$; p-value = 0.160).

Among healthcare workers, doctors had the highest prevalence of musculoskeletal disorders at 58 (40.8%), followed by nurses at 44 (28.0%). The association between healthcare profession and musculoskeletal disorders was not statistically significant ($\chi 2 = 0.121$; p-value = 0.115).

Respondents who had worked for 1-3 years had a prevalence of musculoskeletal disorders of 66 (31.1%), while those who had worked for ≥10 years had the highest prevalence at 6 (60.0%). The association between years in current occupation and musculoskeletal disorders was not statistically significant ($\chi 2 = 3.888$; p-value = 0.274).

Respondents who worked >96 hours per week had a prevalence of musculoskeletal disorders of 11 (37.9%), compared to those working ≤48 hours, with a prevalence of 36 (35.3%). The association between working hours and musculoskeletal disorders was not statistically significant ($\chi 2 = 0.654$; p-value = 0.721).

A significantly higher proportion of respondents who worked shifts, 176 (83.0%), had musculoskeletal disorders compared to those who did not, 43 (36.8%). The association between working shifts and musculoskeletal disorders was statistically significant ($\chi 2 = 72.513$; p-value <0.001).

TABLE 6: Predictors of Musculoskeletal Disorders Among Respondents

Predictors	B (regression coefficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age (years)	0.008	1.008	0.948	1.072	0.795
Sex					
Male	-0.249	0.780	0.434	1.401	0.405
Female*		1			
Marital Status					
Married	0.131	1.139	0.532	2.443	0.737
Unmarried*		1			
Healthcare worker					
Doctors	-0.830	0.436	0.241	0.790	**0.006**
Non-doctors*		1			
Years in current occupation					
1-3 years	1.603	4.968	0.714	34.586	0.105
4-6 years	1.354	3.871	0.654	22.927	0.136
7-9 years	0.179	1.196	0.158	9.051	0.862
≥ 10 years*		1			
Working hours per week					
≤ 48 hours	0.472	1.604	0.556	4.627	0.382
49-96 hours	0.428	1.534	0.561	4.200	0.405
> 96 hours*		1			
Work shifts					
Yes	2.314	10.118	5.670	18.054	**<0.001**
No*		1			

CI = Confidence interval; **OR** = Odd ratio; *reference category; R^2 =02.3%-8.7%

For every one-year increase in age, there is 1.008 (95% CI = 0.948 - 1.072, p = 0.795) more likelihood of experiencing musculoskeletal disorders (MSDs), though this was not statistically significant. Male respondents were 0.780 (95% CI = 0.434 - 1.401, p = 0.405) times more likely to report MSDs compared to female respondents, but this was not statistically significant.

Married respondents were 1.139 (95% CI = 0.532 - 2.443, p = 0.737) times more likely to experience MSDs compared to unmarried respondents, and this was not statistically significant.

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Healthcare workers who were doctors were 0.436 (95% CI = 0.241 - 0.790, p = 0.006) times less likely to experience MSDs compared to non-doctors, and this was statistically significant. Respondents who had worked for 1-3 years were 4.968 (95% CI = 0.714 - 34.586, p = 0.105) times more likely to report MSDs compared to those who had worked for ≥10 years, though this was not statistically significant. Respondents with 4-6 years in their current occupation were 3.871 (95% CI = 0.654 - 22.927, p = 0.136) times more likely to experience MSDs compared to those with ≥10 years of experience, and this was also not statistically significant. Respondents with 7-9 years of experience were 1.196 (95% CI = 0.158 - 9.051, p = 0.862) times more likely to report MSDs compared to those with ≥10 years of experience, and this was not statistically significant.

Respondents who worked ≤48 hours per week were 1.604 (95% CI = 0.556 - 4.627, p = 0.382) times more likely to experience MSDs compared to those working >96 hours per week, and this was not statistically significant. Respondents working 49-96 hours per week were 1.534 (95% CI = 0.561 - 4.200, p = 0.405) times more likely to report MSDs compared to those working >96 hours per week, but this was not statistically significant.

Respondents who worked shifts were 10.118 (95% CI = 5.670 - 18.054, p < 0.001) times more likely to experience MSDs compared to those who did not work shifts, and this was statistically significant.

SECTION C: ERGONOMIC RISK FACTORS

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TABLE 7: Ergonomic Risk Factors Among Respondents

Variables	Never (n = 329) Freq (%)	Rarely (n =329) Freq (%)	Sometimes (n=329) Freq (%)	Often (n=329) Freq (%)	Always (n=329) Freq (%)
Repetitive movements					
Neck	48 (14.6)	71 (21.6)	90 (27.4)	95 (28.9)	25 (7.6)
Shoulders	46 (14.0)	77 (23.4)	99 (30.1)	83 (25.2)	24 (7.3)
Wrist/Hands	35 (10.6)	67 (20.4)	95 (28.9)	87 (26.4)	45 (13.7)
Awkward postures					
Neck	48 (14.6)	64 (19.5)	107 (32.5)	93 (28.3)	17 (5.2)
Shoulders	48 (14.6)	71 (21.6)	114 (34.7)	77 (23.4)	19 (5.8)
Back	28 (8.5)	50 (15.2)	125 (38.0)	94 (28.6)	32 (9.7)
Forceful exertions					
Lifting heavy objects	96 (29.2)	117 (35.6)	98 (29.8)	15 (4.6)	3 (0.9)
Pushing/pulling	90 (27.4)	135 (41.0)	68 (20.7)	28 (8.5)	8 (2.4)
Vibration exposure					
Whole body	159 (48.3)	120 (36.5)	39 (11.9)	4 (1.2)	7 (2.1)
Hand-arm	123 (37.4)	124 (37.7)	55 (16.7)	22 (6.7)	5 (1.5)

Regarding repetitive movements, the majority of respondents, 95 (28.9%), reported experiencing neck strain often, while 90 (27.4%) experienced it sometimes. For the shoulders, 99 (30.1%) of respondents reported repetitive strain sometimes, while 83 (25.2%) experienced it often. In the wrists/hands, 95 (28.9%) reported repetitive strain sometimes, and 87 (26.4%) reported it often.

In terms of awkward postures, 107 (32.5%) of respondents reported experiencing neck strain sometimes due to awkward postures, while 93 (28.3%) experienced it often. For the shoulders, 114 (34.7%) of respondents experienced awkward postures sometimes, while 77 (23.4%) experienced it often. Discomfort in the back due to awkward postures was reported sometimes by 125 (38.0%) of respondents, and often by 94 (28.6%).

For forceful exertions, lifting heavy objects was reported rarely by 117 (35.6%) of respondents and sometimes by 98 (29.8%). Pushing/pulling was reported rarely by 135 (41.0%) of respondents and sometimes by 68 (20.7%).

Regarding vibration exposure, 159 (48.3%) of respondents reported never experiencing whole-body vibration, while 120 (36.5%) experienced it rarely. For hand-arm vibration, 124 (37.7%) of respondents experienced it rarely, while 123 (37.4%) reported never experiencing it.

TABLE 8: Duration for Prolonged Sitting and Standing Among Respondents

Variables	Frequency (n = 329)	Percent (%)
Hours for prolonged sitting		
1-5 hours	243	73.9
> 5hours	86	26.1
Hours for prolonged standing		
1-5 hours	225	68.4
> 5hours	104	31.6

Regarding prolonged sitting, the majority of respondents, 243 (73.9%), reported sitting for 1-5 hours, while 86 (26.1%) reported sitting for more than 5 hours.

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In terms of prolonged standing, 225 (68.4%) of respondents reported standing for 1-5 hours, while 104 (31.6%) reported standing for more than 5 hours.

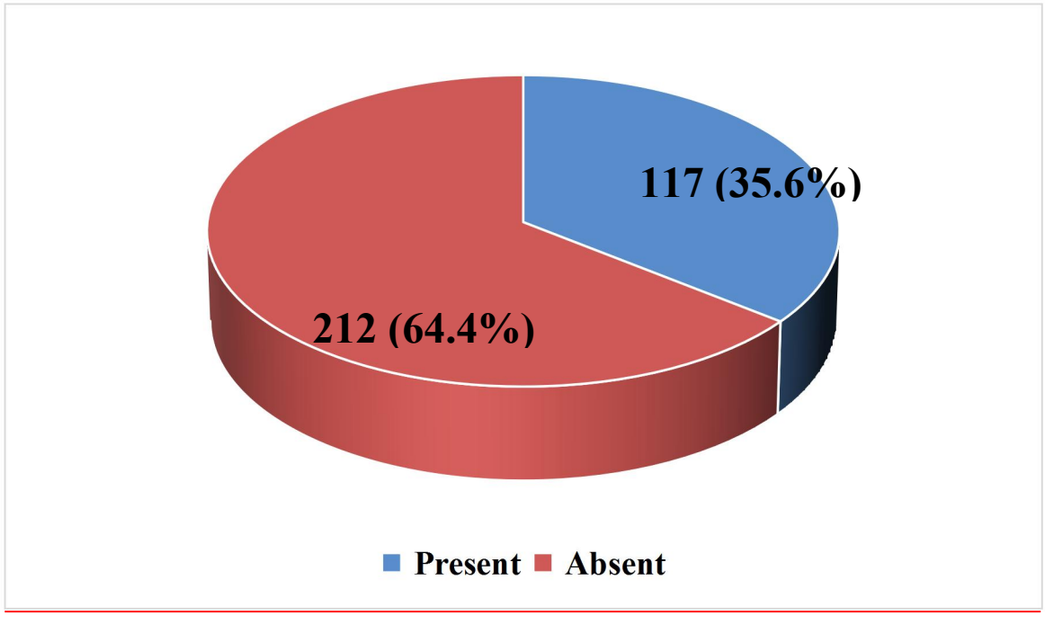

Figure 2: Overall risk factors of Musculoskeletal Disorders among Respondents.

Over one-third of the respondents had risk factors of musculoskeletal disorders, up to 117 (35.6%) while 212 (64.4%) did not.

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TABLE 9: Socio-demographic characteristics and Risk Factors of Musculoskeletal Disorders Among Respondents

Variables	Risk factors (n = 329)		Test statistic	p-value
	Present (%) 117 (35.6)	Absent (%) 212 (64.4)		
Age (years)				
18-29	74 (35.9)	132 (64.1)	$\chi^2 = 2.270$	0.518
30-39	34 (36.6)	59 (63.4)		
40-49	9 (34.6)	17 (65.4)		
≥ 50	0 (100.0)	4 (100.0)		
Sex				
Male	49 (39.5)	75 (60.5)	$\chi^2 = 1.358$	0.244
Female	68 (32.2)	137 (66.8)		
Marital status				
Unmarried	82 (34.9)	153 (65.1)	$\chi^2 = 0.694$	0.707
Married	35 (37.2)	59 (62.8)		
Health care worker				
Doctors	69 (48.6)	73 (51.4)	$\chi^2 = 21.772$	**<0.001**
Nurses	39 (24.8)	118 (75.2)		
Pharmacists	0 (0.0)	6 (100.0)		
Medical Laboratory Scientists	8 (38.1)	13 (61.9)		
Physiotherapists	1 (33.3)	2 (66.7)		
Years in current occupation				
1-3 years	77 (36.3)	135 (63.7)	$\chi^2 = 0.250$	0.969
4-6 years	33 (34.4)	63 (65.6)		
7-9 years	4 (36.4)	7 (63.6)		
≥ 10 years	3 (30.0)	7 (70.0)		
Working hours per week				
≤ 48 hours	37 (36.3)	65 (63.7)	$\chi^2 = 0.579$	0.749
49-96 hours	68 (34.3)	130 (65.7)		
> 96 hours	12 (41.4)	17 (58.6)		
Work shifts				
Yes	85 (40.1)	127 (59.9)	$\chi^2 = 5.343$	**0.021**
No	32 (27.4)	85 (72.6)		

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Respondents aged 30-39 had the highest prevalence of risk factors at 34 (36.6%), but the association between age and risk factors for musculoskeletal disorders was not statistically significant ($\chi 2 = 2.270$; p-value = 0.518).

A higher proportion of male respondents, 49 (39.5%), had risk factors for musculoskeletal disorders compared to female respondents, 68 (32.2%). However, the association between sex and risk factors for musculoskeletal disorders was not statistically significant ($\chi 2 = 1.358$; p-value = 0.244).

Unmarried respondents had a prevalence of 82 (34.9%) for risk factors of musculoskeletal disorders compared to married respondents at 35 (37.2%). The association between marital status and risk factors was not statistically significant ($\chi 2 = 0.694$; p-value = 0.707).

Among healthcare workers, doctors had the highest prevalence of risk factors at 69 (48.6%), followed by medical laboratory scientists at 8 (38.1%). The association between healthcare profession and risk factors for musculoskeletal disorders was statistically significant ($\chi 2 = 21.772$; p-value <0.001).

Respondents who had worked for 1-3 years had a prevalence of 77 (36.3%) for risk factors, with the lowest prevalence seen among those who had worked for ≥10 years at 3 (30.0%). The association between years in current occupation and risk factors for musculoskeletal disorders was not statistically significant ($\chi 2 = 0.250$; p-value = 0.969).

Respondents working >96 hours per week had a prevalence of 12 (41.4%) for risk factors of musculoskeletal disorders, compared to those working ≤48 hours, with a prevalence of 37

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(36.3%). The association between working hours and risk factors for musculoskeletal disorders was not statistically significant ($\chi 2 = 0.579$; p-value = 0.749).

A significantly higher proportion of respondents who worked shifts, 85 (40.1%), had risk factors for musculoskeletal disorders compared to those who did not, 32 (27.4%). The association between working shifts and risk factors for musculoskeletal disorders was statistically significant ($\chi 2 = 5.343$; p-value = 0.021).

SECTION D: COPING STRATEGIES AND TREATMENT OPTIONS

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TABLE 11: Coping Strategies and Treatment Options Among Respondents

Variables	Frequency (n = 329)	Percent (%)
Self-management*		
Rest	323	98.2
Exercise/stretching	274	83.3
Use of ergonomic aids	61	18.5
Over the counter medications	177	53.8
Professional treatment*		
Physiotherapy	52	15.8
Chiropractic care	14	4.3
Massage therapy	136	41.3
Prescription medication	156	47.4
Surgery	7	2.1
Workplace adjustments*		
Change in job tasks	91	27.7
Adjustments in work environment	220	66.9
Use of assistive devices	69	21.0

*Multiple responses

Among the self-management strategies, nearly all respondents, 323 (98.2%), reported resting as a coping strategy, while 274 (83.3%) engaged in exercise or stretching. The use of ergonomic aids was reported by 61 (18.5%) of respondents, and over-the-counter medications were used by 177 (53.8%).

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For professional treatment, 156 (47.4%) of respondents reported using prescription medication, while 136 (41.3%) sought massage therapy. Physiotherapy was used by 52 (15.8%) of respondents, chiropractic care by 14 (4.3%), and surgery by 7 (2.1%).

In terms of workplace adjustments, 220 (66.9%) of respondents made adjustments to their work environment, while 91 (27.7%) reported changes in job tasks. The use of assistive devices was reported by 69 (21.0%) of respondents.

DISCUSSION

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This study assessed the prevalence, musculoskeletal types, risk factors, and coping strategies of healthcare workers regarding musculoskeletal disorders in public health facilities in Benin City, Edo State. Results showed the presence of MSDs among the healthcare workers especially affecting the lower back and neck region.

The age distribution of the respondents reflects a predominantly young workforce, as nearly two-thirds of healthcare workers fell within the 18-29 age group. This finding is similar with a study conducted to assess the prevalence of MSDs and their associated factors where most of the respondents were less than thirty years.[67] The importance of younger health professionals lies in their ability to bring innovation, technological proficiency, and a fresh perspective to the healthcare sector. The older healthcare workers are also important as they have extensive hands-on experience, enabling them to manage complex and critical cases effectively, while serving as mentors for younger healthcare workers.

The representation of gender in the study showed that there were more females than male. A possible explanation for this finding could be the higher representation of female respondents, particularly in the nursing profession as the nursing profession traditionally has a higher percentage of female practitioners and as a result, the overall gender distribution within the respondent pool may have influenced the observed trend. This discovery corresponds with a study conducted in Zimbabwe among nurses, aimed at determining the prevalence, consequences, and factors associated with WMSDs which showed a larger proportion of females than males.[49] The higher proportion of female health workers points to the increasing level of inclusion of the female gender into the health sector workforce.

Our study revealed that the lower back was the anatomical part that was affected the most musculoskeletal disorder affecting over two-thirds of respondents. This may be due to the prolonged periods of standing experienced by the healthcare workers. This finding is similar with a 2016 study conducted in Osun state to determine the prevalence and pattern of WMSDs among healthcare workers which showed that the lower back was the most affected region affecting over 60% of respondents.[45] Addressing lower back pain through ergonomic interventions will help improve healthcare worker productivity as well as reduce absenteeism due to discomfort or injury.

The yearly and weekly prevalence of musculoskeletal disorder among health care workers was 57.8% and 83.3% respectively. This finding was probably due to the high patient load among healthcare workers in tertiary institutions. A study that assessed the prevalence of work-related musculoskeletal disorders among healthcare workers in five hospitals in Pakistan reported higher prevalence rates. The study revealed that the 12- month and 7- day prevalence of rates of WMSDs was 75.35% and 83.45% respectively.[47] This contrasting finding could be due to sociocultural and workplace differences. Musculoskeletal disorders can impair the proper functioning of healthcare workers reducing their ability to perform effectively, potentially affecting patient safety and quality of care.

On the healthcare workers with musculoskeletal disorders, doctors had the highest proportion of healthcare workers with the disorder. However, the relationship between MSDs and healthcare workers was not statistically significant. This may due to increased responsibility carried out by doctors as they are the head of the medical team. A similar finding was seen in a 2020 review which revealed that surgeons and dentists are more vulnerable to musculoskeletal disorders when compared to physiontherapists.[48] High rates of musculoskeletal disorders among doctors can lead

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to burnout, threatening the sustainability of the workforce. Extra healthcare costs could arise from treatment of MSDs, creating an economic burden on doctors and other healthcare workers.

As age increased, respondents were more likely to come down with musculoskeletal disorders. This may be due to natural decrease in bone strength and muscle mass that comes with increased ageing. Similar findings were obtained from a 2021 Malaysian study conducted among nurses with the aim of estimating the prevalence and determining risk factors of MSDs which showed that the frequency of having musculoskeletal symptoms in any body region increased with age and lower education level.[54] Increase in age comes with an increased susceptibility to musculoskeletal issues and as such, special interventions should be put in place to cater for the older healthcare workers to help them cope with the workload.

Although not statistically significant, males were less likely to have musculoskeletal disorders than females. Nurses, of which females are a majority, were the most represented in our study. They often perform physically demanding tasks such as lifting, moving, and transferring patients which can place strain on their musculoskeletal system and this could be a responsible for the finding. A Vietnamese study that determined the prevalence and associated factors of musculoskeletal disorders among nurses which showed that women were 2.1 times more likely to develop MDs than males.[53] The work environment should be favourable for all gender to improve productivity and health outcomes.

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With increasing years in current occupation, there was an increase in the prevalence of MSDs. However, the association between years in current occupation and MSDs was not statistically significant. A 2021 finding showed similar findings where with increasing work experience, respondents were more likely to have MSDs.[67] It is important for healthcare workers who have

worked for long in an institution to develop strategies that will help them cope with increasing risk of MSDs.

Respondents that worked night shifts significantly had musculoskeletal disorders in compared to those that didn't. This may be due to the extra hours involved in working shifts. This is in tandem with a 2021 Ethiopian finding that assessed the prevalence and factors associated with work-related musculoskeletal disorders among healthcare workers in an operating room. Working overtime, previous history of MSDs, and working in night shifts were significantly associated with musculoskeletal disorders.[55] Working in shifts especially at night could affect the circadian rhythm leading to poor sleep quality and negative health outcomes.

Majority of respondents suffered from prolonged standing and prolonged sitting. This may be due to the job description of healthcare workers that involves lots of standing and sitting. A study in Ogun state assessed the pattern and predictors of musculoskeletal disorders among employees in a federal medical centre revealed that the prolonged standing and prolonged sitting were the most prevalent ergonomic hazard among respondents.[56] Sitting or standing for long hours not only predisposes to MSDs but could also affect job satisfaction and affect the mental health of healthcare workers.

On the coping strategies and treatment options towards MSDs, self-management techniques involving rest, exercise/stretching, use of ergonomic aids and over the counter medications were the most common used. These forms of coping strategies y can be implemented largely with little to no external resource, and could be a reason why they were the most used. A 2019 study in Lagos state showed that seeking assistance to manage heavy patients, modifying nursing procedures, and adjusting nursing position were coping strategies used by nurses.[51] Differences

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in the study population could be a reason for the contrasting findings. Promoting rest and other self-management coping strategies can result in better overall health outcomes, reducing the prevalence of MSDs.

CONCLUSION

The 12-month prevalence of MSD among healthcare workers in UBTH was 57.8% while the 7-day prevalence was 83.3%.

The major types of MSDs affecting healthcare workers were mainly disorders in the lower back and neck region.

Ergonomic factors like prolonged standing, prolonged sitting, and repetitive movements were risk factors that contributed largely to MSDs.

Healthcare workers mainly utilized self-management coping mechanisms like rest, exercise, and over the counter medications to deal with MSDs.

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RECOMMENDATIONS

To the Federal Government

1. They should develop and enforce regulations that establish ergonomic standards in healthcare settings in an attempt to minimize physical strain and injury risk.
2. Allocate funding for ergonomic assessments and improvements in healthcare facilities to ensure that hospitals can invest in the necessary ergonomic tools and training.
3. Work together with hospital managements to organize training sessions focused on ergonomics and injury prevention among healthcare workers.

To UBTH management

1. They should conduct regular ergonomic assessments of workstations and practices, identifying high risk areas and implementing corrective measures.
2. They should structure the night shifts and call schedules to avoid them from being irregular and excessive.
3. They should invest in more ergonomic equipment to help reduce the physical strain on healthcare workers.

To Healthcare Workers

1. They should incorporate resting and taking periodic breaks to prevent the likelihood of MSDs.
2. Actively advocate for improvements in working conditions to reduce the likelihood of MSDs.

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APPENDIX

QUESTIONNARIE

ASSESSMENT OF ERGONOMIC HAZARDS AMONG HEALTHCARE WORKERS IN UNIVERSITY OF BENIN TEACHNG HOSPITAL

Dear respondent,

I am a 600-level student at the School of Medicine, University of Benin, Benin City. I am researching to assess ergonomics among health care workers at the University of Benin Teaching Hospital, Benin City, Edo State. This questionnaire will serve as a data collection tool for this research. Your honest responses are invaluable, and all provided information will be greatly appreciated and treated with the utmost confidentiality.

SECTION A: GENERAL INFORMATION OF HEALTHCARE WORKERS

1. Age(as at last birthday)_____years.
2. Sex: Male [ ], Female [ ]
3. Marital status: Single [ ] Married [ ] Separated [ ] Divorced [ ] Widowed [ ] Cohabiting []
4. Tribe: Bini: [ ], Esan [ ], Igbo [ ], Urhobo [ ], Yoruba [ ], Hausa [ ], Others please specify _____
5. Religion: Christianity [ ] Islam [ ] African Traditional Religion [ ] Others please specify
6. Category of health personnel: Doctor [ ] nurse [ ] pharmacist [ ] laboratory scientists [ ] Other: please specify
7. Department/Unit_____
8. Specialty _____
9. Years in Current Occupation: _____
10. Working Hours per Week: _____
11. Do you work night shifts: Yes[ ], No [ ]

SECTION B: PREVALENCE AND TYPES OF MUSCULOSKELETAL DISORDERS

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Please indicate if you have experienced any discomfort, pain, or ache in the following body regions over the last 12 months and the last 7 days.

Body Region	Discomfort in the Last 12 Months (Yes/No)	Discomfort in the Last 7 Days (Yes/No)
Neck		
Shoulders		
Upper Back		
Elbows		
Wrists/Hands		
Lower Back		
Hips/Thighs		
Knees		
Ankles/Feet		

SECTION C: ERGONOMIC RISK FACTORS

Please rate the following risk factors in your work environment from 1 (Never) to 5 (Always).

1. Repetitive movements:
    - Neck: 1 2 3 4 5
    - Shoulders: 1 2 3 4 5
    - Wrists/Hands: 1 2 3 4 5
2. Awkward postures:
    - Neck: 1 2 3 4 5
    - Shoulders: 1 2 3 4 5
    - Back: 1 2 3 4 5
3. Forceful exertions:
    - Lifting heavy objects: 1 2 3 4 5
    - Pushing/Pulling: 1 2 3 4 5
4. Prolonged sitting:
    - Hours per day: _____
5. Prolonged standing:
    - Hours per day: _____
6. Vibration exposure:
    - Whole body: 1 2 3 4 5
    - Hand-arm: 1 2 3 4 5

SECTION D: COPING STRATEGIES AND TREATMENT OPTIONS

Please indicate if you have used any of the following strategies or treatments to manage musculoskeletal discomfort:

1. **Self-Management:**
    - Rest: Yes[ ], No [ ]
    - Exercise/Stretching: Yes[ ], No [ ]

- Use of ergonomic aids (e.g., ergonomic chair, wrist supports): Yes[ ], No [ ]
- Over-the-counter medication: Yes[ ], No [ ]

2. **Professional Treatment:**
   - Physiotherapy: Yes[ ], No [ ]
   - Chiropractic care: Yes[ ], No [ ]
   - Massage therapy: Yes[ ], No [ ]
   - Prescription medication: Yes[ ], No [ ]
   - Surgery: Yes[ ], No [ ]
3. **Workplace Adjustments:**
   - Change in job tasks: Yes[ ], No [ ]
   - Adjustments in work environment (e.g., better seating, adjustable desk): Yes[ ], No [ ]
   - Use of assistive devices (e.g., lifting aids, anti-fatigue mats): Yes[ ], No [ ]

SECTION E: ADDITIONAL COMMENTS

1. Please describe any other coping strategies or treatments you have used that were not listed above:

   _____

2. Please provide any additional comments or suggestions regarding your musculoskeletal health and workplace ergonomics:

   _____

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Thank you for participating in this survey. Your responses will help us better understand and address musculoskeletal health and ergonomic issues in the workplace.

_____

This questionnaire combines elements of the Standard Nordic Musculoskeletal Questionnaire (NMQ) with additional questions to address ergonomic risk factors and coping strategies.

TIMELINE

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The timeline is represented in the Gantt chart below:

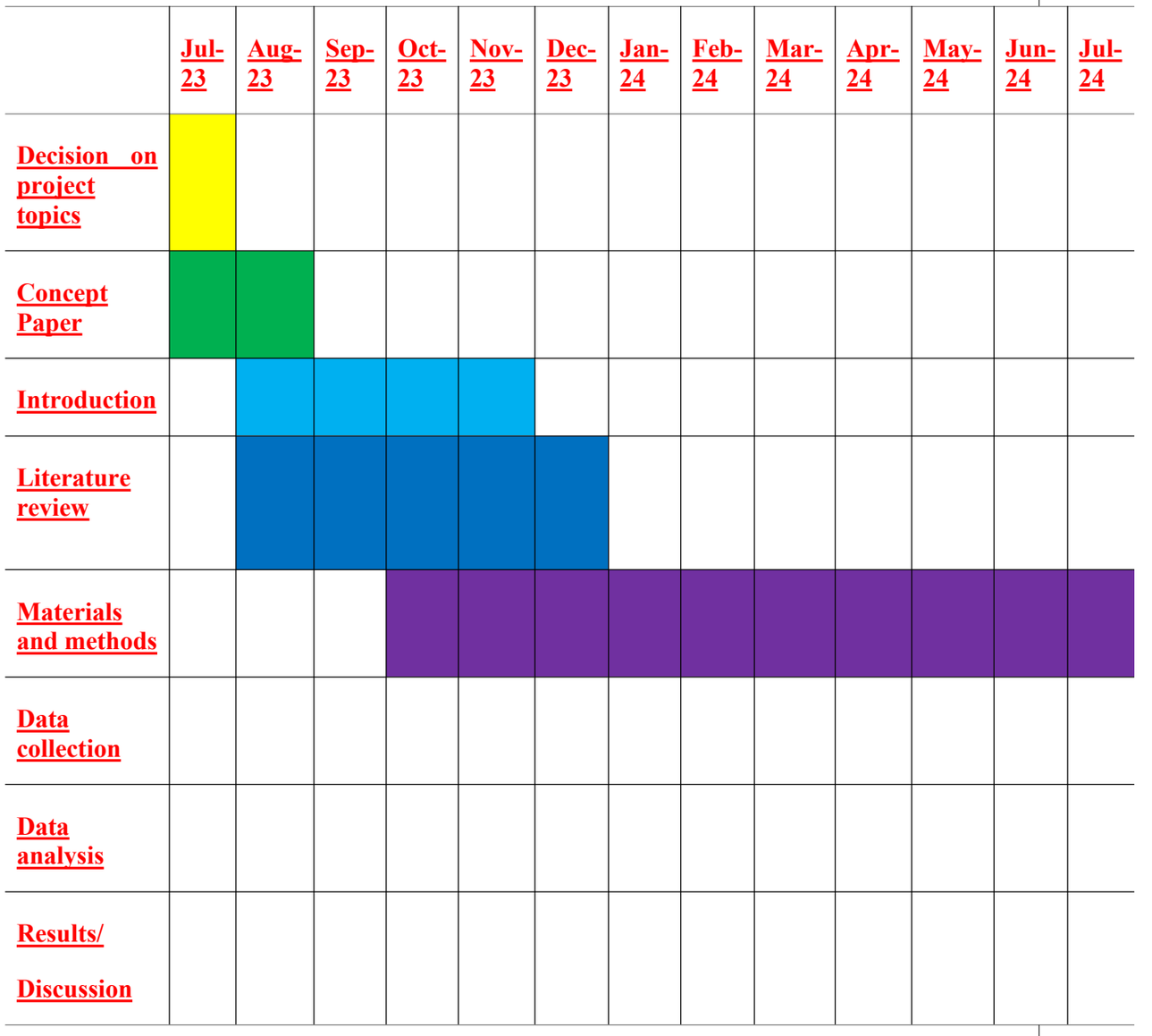

FIGURE 1: Gantt chart showing the work plan of the one-year project