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Role of Work Controls in Preventive Management of Musculoskeletal Disorders in Building Projects:

Case Study, Masonry Workers, Nairobi County, Kenya

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Abstract

Despite extensive research on preventive and control, masonry workers continue to suffer from work-related musculoskeletal disorders worldwide. Administrative and engineering control interventions have not yielded the desired results, leading to a search for Work-related Musculoskeletal Disorders (WMSD) preventive solutions in organizational, cognitive, and participatory ergonomic fields. This study focused on the role of masonry work control in preventive management of musculoskeletal disorders in building projects: case study of masonry workers, Nairobi County, Kenya. Relevant literature was reviewed; knowledge gaps, applicable theories, methodology, and variables identified and objectives and research questions formulated. The null (Ho) hypothesis was that there was no statistically significant relationship between masonry work control practices (independent variable) and preventive management of work-related musculoskeletal disorders of masonry workers (dependent variable). The alternative (Ha) hypothesis was that there was a statistically significant relationship between the independent and the dependent variable of the study. The total study population consisted of masonry workers registered with NCA (2020) within the geographical area of the study. The sample size was determined using stratified random sampling, and the participants were selected using purposeful random sampling. Data was collected using questionnaires, interview guides, relevant books, journals, and online resources. Descriptive analysis was employed to identify central tendencies in the data. The Spearman rank-ordered correlation results (95% confidence level) revealed a moderate positive and statistically significant relationship between the independent and dependent variable of the study, rho (0. 001, $p < 0.05$. The masonry worker safety was undermined due to productivity prioritization over worker health and safety, under-representation on safety committees, inadequate training, insufficient guidance on compliance requirements; a lack of performance recognition, and appropriate workplace risk management strategy. Proposed interventions included review of existing training programs to include participatory ergonomic practices, occupational safety and health framework to include multifaceted stakeholders' intervention, improving the work environment, communication, information sharing, statutory compliance, employer and worker incentive policies.

Keywords: Masonry work control practice, musculoskeletal disorders, prevention, ergonomics

INTRODUCTION

The building industry significantly contributes to global Gross Domestic product (GDP), impacting prosperity, health, and citizens' quality of life worldwide (Gopalakrishnan & Kumar, 2020; Lean, 2001). The industry serves as the foundation of a nation's prosperity, providing capital input into manufacturing and wealth generation, creating job opportunities for its citizens, and supporting other sectors of the economy (Alaloul et al.,2021). For instance, the total output value of China's construction sector reached 29.307 trillion CNY in 2021, contributing to 25.63% of the GDP and producing 53.67 million job opportunities (Liu et al. 2021); National Bureau of Statistics of PRC China,2021). The construction sector of the United States employed 11 million people in 2017. (Center for Construction Research and Training, 2018). The con-struction sector contributed nearly 7.2 billion US dollars to Kenya's GDP in 2022 (Cowl-ing, 2024).

Despite significant contributions to the global

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economy, the construction sector is recognized among the riskiest businesses internationally. (Kong et al., 2018; Anwer et al., 2021a,). According to World Health Organization research, musculoskeletal disorders (MSDs) are one of the leading causes of work-related injuries and impairments worldwide (Lette, A. et al. (2018). reports pub-lished in 2019 by the Global Burden of Diseases, musculoskeletal problems were among the top 20 primary sources of disease burden across all ages. According to the BLS (2020), estimates, there were 5,333 reported fatal occupational injuries in the United States construction sector in 2019, a 2% rise from 5,250 in 2018. Nath et al. (2017) noted that the construction industry was one of the leading contributors to WMSD, affecting in 45 per 10,000 workers compared to other industries of the global economy.

The incidence rate of WMSDs among Hong Kong construction workers (3-month prevalence) was 41% in 2015, and Saudi Arabia (12-month prevalence) was 48.5% in 2014.In Malaysia, at 67.7% in 2016 (12-month prevalence), Nigeria (7-day prevalence) at 87.3% in 2022 and Pakistan (7-day prevalence) 89% in 2022 (Alghadir & Anwer,2015; Deroset et al., 2014; Yi & Chan, 2016; Kashif et al., 2022; Adedoyin et al. 2022). Kisilu et al. (2017) established that 98.1% of the workers in construction sites within Mombasa County, Kenya suffered work-related bodi-ly problems, with the lower part of the back (68%) being the most often reported musculoskele-tal ailment symptom. Only 2.7% of respondents accessed medical advice during 12 months (preferred). These studies presented a general view of how widespread the WMSD phe-nomenon has been among construction workers globally. The research further revealed that WMSDs not only cause great physical and mental health distress in workers, but they also place a significant strain on healthcare systems and, as a result, on our society (Cieza et al., 2019; Engholm & Holmström, 2005).

This investigation was about masonry trade-specific work-related musculoskeletal disorders similar to the study by Adedoyin et al. (2022). Masonry work is a highly skilled and labor-intensive art involving the construction of structures using stone, bricks, or concrete blocks. It is carried out in diverse geographical locations, from simple rural buildings to complex multi-billion-dollar developments in cities and towns. Masonry workers are prone to developing work-related musculoskeletal problems due to the strenuous nature of their professions, which require awkward body positions, heavy lifting, and repeated actions (Smith et al.,2023, Boschman et al.,2012). Socio-demographic factors and underlying pathologies have also been associated with development of WMSD among workers (Soares, 2020; Amaro et al., 2018 and Ngan et al., 2010). Richardson et al. (2018) and Roquelaure (2018) hypothesized that organizational restrictions or inaccurate policy models cause job overload and physical hardship, leading to the development of workers' WMSDs. Work-related stress stemming from tight delivery schedules in everyday operations leads to continuous physical, emotional, and mental strain on masonry workers, resulting in the development of WMSDs (Roquelaure, 2018; Dianat et al., 2015).

Work-related musculoskeletal disorders among masonry workers cause damage to their nervous systems, muscles, tendons, ligaments, cartilage, and vertebral discs, resulting in severe pain and incapacity, which increases anger, depressive disorders, and aging due to stress (Suni et al., 2018; Alghadir & Anwer, 2015; Shuai et al., 2014). Prolonged work-related musculoskeletal disorders WMSD cause the development of diseases such as carpal tunnel syndrome and ten-dinitis (Adisesh, 2013). The economic and societal impacts of these illnesses include employee absences, reduced productivity, high medical costs, and insurance claims. (Lee, et al., 2021).

It is imperative for employers and employees to prevent work-related musculoskeletal disorders (WMSDs) in workplaces by implementing controls to manage them efficiently. A concentrated effort focusing on the indicated causes is required to avoid masonry workers' reduction of work capability and early forced workplace exit as a result of WMSDs (EUROSTAT, 2003).

Despite all suggested preventive and control, the WMSD phenomenon seems to be on an increase globally. The fragmented approach and inconsistencies in the literature reviewed on how masonry work related WMSDs was to be solved was indicative of the magnitude of the problem and the urgency for researching on alternative methods of dealing with it. The re-viewed literature did not seem to give adequate attention

to workers involvement in risk man-agement decision making, work organization and culture management, and Occupational Safety and Health (OSH) policy varia-bles and their impact on masonry work controls and the prevention of musculoskeletal diseases in construction sites. The purpose of the study was to evaluate the effects of these variables on the masonry control practice in preventative management of WMSDs of masonry workers and to offer practical suggestions for improving the health and safety of masonry workers.

THEORY

The reviewed literature suggested various preventive and control methods to address work-related musculoskeletal disorders of workers. Poon et al. (2022) and Macdonald & Oakman (2015) opined that WMSD incidents can be considerably reduced by implementing workplace ergonomic best practices. Oakman, Clune, & Stuckey (2019) suggested an ergonomic framework to address various workplace aspects requiring intervention such as individual, task-specific, organizational and job design, work environment. The approach recommended dealing with individual interventions by focusing on changes in a worker's behaviour through ergonomic training, workouts, and education. The task-specific methods were designed to change how individuals interacted with work tools, equipment, and workstations. Work organization and job design treatments included adjusting working hours and providing manager training on thorough work risk management. The working environment category covered treatments that addressed the physical and mental environment, such as general organizational culture and job security.

The multifactorial approaches category encompassed a variety of therapies. Gupta and Choudhary (2021); Shuai et al. (2014) observed that a large number of construction workers lacked knowledge about workplace ergonomic procedures, thus affecting their implementation effectiveness. Hossain et al. (2020) highlighted the significance of safety culture and organizational support in encouraging the use of ergonomic techniques. Karwowski & Marras (2003) advocated for Engineering and Administrative Controls as methods of preventing work-related musculoskeletal disorders of workers. Other suggestions included identification and evaluation workplace risks for purposes of elimination, mitigation, acceptance or transfer. Where risks were unavoidable and therefore accepted, they were to be identified, assessed, streamlined, prioritized, mitigated and monitored for responsiveness and improvements

The reviewed literature highlighted the physically demanding nature of masonry work, which involves constructing buildings using bricks, stones, and concrete blocks, excluding plaster and tilework. The Bureau of Labor Statistics (2023) emphasizes the labor-intensive and risky conditions masonry workers face daily, potentially impacting their safety and health. Babak, (2012); Bazaluk et al. (2023) suggested that adoption of ergonomic best practices mitigated these risks. The National Research Council & Institute of Medicine (2001); Fujishiro et al. (2005), and Demerouti et al. (2001) link excessive workloads, awkward postures, repetitive tasks, and low social support to work-related musculoskeletal disorders among masonry workers, leading to low job satisfaction and high stress levels.

Leyshon et al. (2010) recommended selection of tools, equipment, and work methods. The design of work to involve matching the needs and capabilities of the worker with the tasks they were assigned to complete. Kuijt-Evers et al. (2004) and Adisesh (2013) proposed that correct tool and equipment selection, maintenance, and user training were required to minimize or avoid associated WRMD injuries and illnesses such as tendinitis and carpal tunnel syndrome. Poor manual material handling practices and non-compliance with standard load lifting techniques and indices significantly contributed to workers lower back pain and fatigue (Heneweer et al. (2011); NIOSH (2018).

Organizational ergonomics emphasized the role of moral courage and effective leadership in enhancing workplace safety and health (Radu, 2023; Ganu, 2018). Cognitive ergonomics had to be considered as cognitive failures led to accidents and injuries (Broadbent et al., 1982; Liko & Esmaeili, 2020). Participatory ergonomics (PE) was claimed to be the best technique for engaging workers in efforts to improve the work environment and their health and safety (EU-OSHA, 2017). Participatory ergonomics

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was the 'involvement of people in planning and controlling a significant amount of their own work activities, with sufficient knowledge and power to influence both processes and outcomes in order to achieve desirable goals' (Wilson,1995). Koningsveld and De Looze (2017) highlighted the importance of worker involvement in workplace activities, saying that active worker participation in adopting ergonomic information, processes, and modifications led to improved workplace conditions, safety, efficiency, effectiveness, morale, and comfort.

Gunningham and Grabosky (1998) argue that subsidies, taxes, tradeable rights, and other economic incentives; regulations apportioning accountability for harms; policies regarding procurement, and implementation of ergonomic 'best practice' programs increased OSH regulatory compliance, including wailful revelation of OSH information to regulators supervisor, workers, consumers, or the public. This method fostered self-regulation or voluntarism at the sector or individual workplace levels, which was better than the command-and-control compliance enforcement operations. The high incidence of work-related musculoskeletal illnesses among construction workers worldwide highlights the importance of comprehensive preventative methods that target both physical and psychological dangers (Ekpenyong & Inyang, 2014; Oakman et al., 2019).

The Theoretical Underpinnings

The study was based on the overarching complexity theory with the general system and chaos being supportive theories. The complexity theory stated that a complex system is a dynamic environment in which several autonomous actors interact, competing, collaborating, and adapting on the verge of chaos. This self-organizing capacity prevented the system from spiraling out of control, leading to emergent properties and behaviors unique to the system as a whole, not found in its individual components (Kricheldorf & Hans, 2016). Complexity theory emphasized qualities such as being unordered, path-dependent, non-linear, spontaneous, and adaptable. It challenged the mechanistic paradigm by recognizing systems as more than the total of their components and interactions, highlighting the importance of self-organizing processes above reductionism.

This theory supported development of a "culture of trust" which embraced diversity, innovation, and collaboration. It offered fresh perspectives to addressing limitations of traditional project management models (Saynisch, 2010). By viewing organizations as Complex Adaptive Systems (CAS), Building construction managers promoted effective workplace risk management through open communication, strong values, and adaptability to change (Larson, 2016). Ultimately, complexity theory helps navigate modern challenges in technology, globalization, and cultural change, presenting opportunities for future societal advancements (Ma & Osula, 2011).

Conceptual Framework

The conceptual framework sought to emphasize the link between masonry work control techniques and the prevention of task-related musculoskeletal illnesses among masonry workers. **Figure 1** shows the study variables, their interrelationships, and potential intervention strategies to mitigate Work-related musculoskeletal disorders among masonry workers.

The conceptual framework depicts how masonry labour techniques, workplace variables, work-er characteristics, and government legislation all impact the management of job-related muscu-loskeletal illnesses. Understanding these associations aided in the development of effective in-tervention strategies to prevent work-related musculoskeletal diseases and improve the health and safety of masonry workers involved in building construction operations.

Hypothesis of the Study

The null (Ho) hypothesis of the study was that there was no statistically significant relationship between existing masonry work control practices and preventive management of musculoskele-tal disorders of masonry workers. The alternative (Ha) hypothesis of the study was that there was a statistically significant relationship between existing masonry work control practices and pre-ventive management of musculoskeletal disorders of masonry workers.

RESEARCH METHODS

The objective of the study was predicated on assumptions regarding how knowledge was to be generated, thus dictating how and what was to be

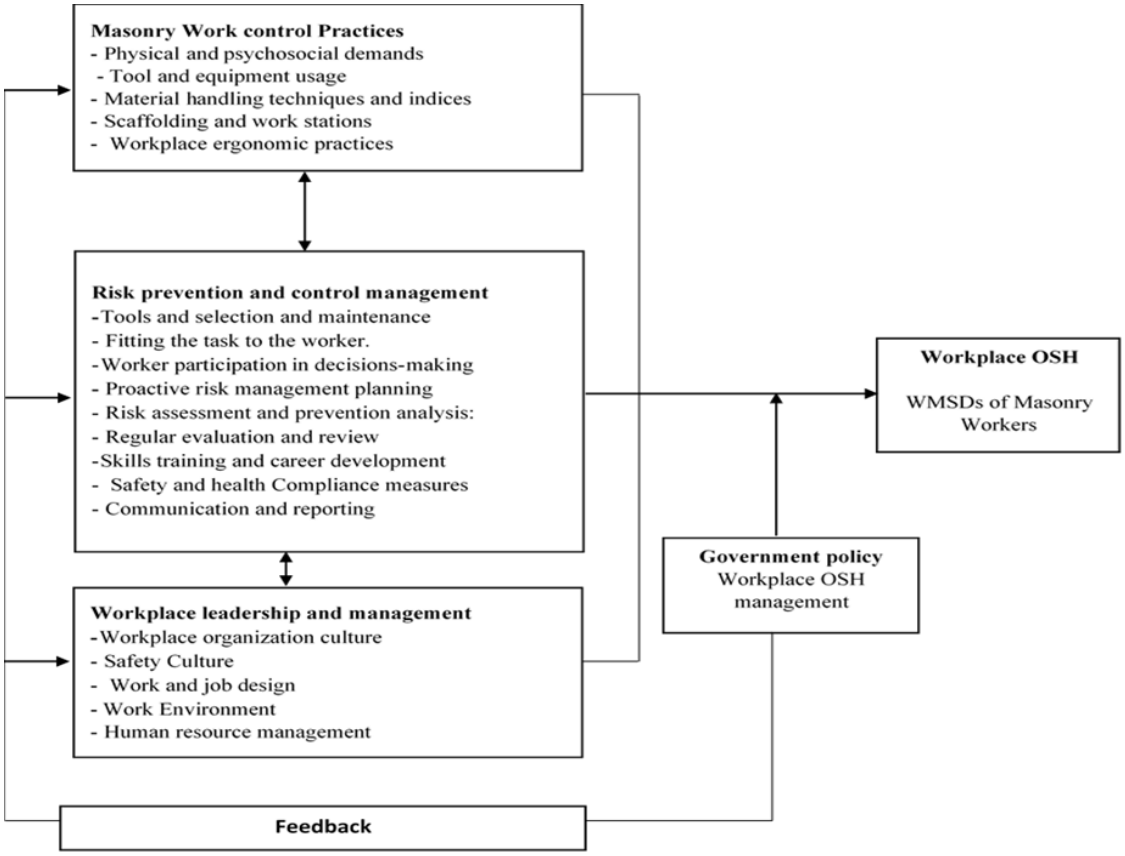

FIGURE 1
Conceptual framework of the study
Source: Field Survey, 2022

unearthed through the inquiry (Cre-swell,2009). The study was based on the assumptions that reality was socially constructed and multiple in nature and that Occupational safety and health management in building construction workplaces sampled were congruent with the construction firms managing them. The inquiry was about unraveling hidden reasons behind the complex, interrelated, and multifaceted social processes obstructing effective masonry work control practices in preventive management of WMSDs of masonry workers. The work was guided and supported by the Interpretivism philo-sophical model and the principles of the complexity theory, respectively (Saunders, Lewis, and Thornhill, 2007; Kricheldorf and Hans, 2016). The study used a multiple-case study methodolo-gy to gather data (Creswell, 2013; Yin, 2009).

The total population for the study were all registered masonry workers National Construction Authority, (2020), with the target population being those working within the geographical boundaries of the study area. The National construction Authority classified building construc-tion firms into eight categories depending on their resource capacities. The construction firms studied were stratified into the into groups in ascending order for data management conven-ience. The proportional stratified and purposeful random sampling techniques was used to de-termine the number of firms for inclusion in the determination of the study sample. The Cochran sampling size formula (1977).

At a designated confidence level of 95% and the desired margin of error (e) of 5 percent (plus or minus), the standardized normal deviation (z-value) for the study (as shown in the z-score table) was 1.96. An estimated 50% of the target population was assumed to have the characteristics sought in the study, thus yielding a probability of 50%, or 0.5. The "p" value for the study was 0.5. The balance (q-value) from "p" to add up to 100% for the study was 1 - P, or 100% minus 50% was 50%, or 0.5. Using Cochran formula; n = z2pq)/d2
Where:
n – desired sample size

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e - desired margin of error),
p - (estimated) assumed to have characteristics being sought in the study
q -1 – p, the balance (q-value) from p to add up to 100%

The desired sample size for the study was calculated as 385, and duly adjusted to 500 to com-pensate for non-response during data collection (Israel (2012).

The management of construction activities of the building work places sampled for the study were assumed to be isomorphic to the building firms managing them, implying that the sample size for the study was 500. The study participants accorded a blind chance selection chance by using the purposeful random sampling technique (Sandelowski, 1995). Participants were eligi-ble for this survey provided they matched the following criteria: (1) over 18 years old; (2) regis-tered with NCA as an artisan. (3) The employer was registered with the NCA. (4) The study eliminated plasterwork and associated masonry work jobs, as well as medical diagnoses of WMSDs among masonry workers.

Field data were collected using Nordic-based standard musculoskeletal research questionnaires (Kuorinka et al., 1987) and an interview guide. The questionnaires were measured on nominal and ordinal Likert (1-5) scale. The tools were developed, pilot- tested and retested for internal consistency before being used for primary data collection for the study. All the SPSS-based Cronbach's alpha coefficient test (Cronbach's,1951) results for reliability were over 0.75, indic-ative of their suitability for use in the study. Secondary data was collected from books, journals, magazines and digital sources relevant for the study. The study questionnaire and interview guides for masonry workers and building construction workplace managers were physically de-livered, filled by participants and collected from the sampled sited as scheduled.

A total of 164 out of 250 responses were obtained, translating to 65.6% which was more than the 60% threshold required for the data analysis exercise to proceed (Mugenda & Mu-genda,2012).

Both descriptive and inferential data analysis were carried out to determine central tendency, relationships, and level of statistical significance. A collection of questionnaire survey respons-es was analyzed using the Relative Importance Index (RII) approach to determine the most rel-evant and significant indicators compared to the least important and pertinent ones (Chen et al.,2010).

The IBM SPSS-27 computer-based Kolmogorov-Smirnov normality test and related assumptions were used to determine that spearman's ranked correlation coefficient technique was the most appropriate statistical technique to be used to assess relationships between the study variables. The ordinal Logistic technique was used to predict an ordinal dependent varia-ble given one or more independent variables.

RESULTS

The results included descriptive and inferential analysis, hypothesis testing.

Demographic factors

Seventy percent (70%) of masonry worker respondents were aged 29 to 39 years old. More than half of them (67.7%) had a secondary or higher level of education,72.9% had trade- test level skill training, 55% had worked for less than one year with the current employer and 68% were compliant with the NCA annual license statutory requirements. The majority (47.4%) of Building Construction Workers (BCW) managers were Technicians (Building construction) with 5 to 9 years accumulated work experience.

The majority of BCW managers (90.6%) leadership was self-driven, confident, consultative, and risk takers with 62% trained in workplace OSH management. Less than half (36.8%) of BCW had developed and rigorously observed workplace rules, and regulations, including ethi-cal standards. More than half (52.0%) of masonry workers were recruited and deployed based on their ability, skills, and competence with 64% being on permanent employment terms. Less than half (15.6% of masonry workers underwent medical examinations before or immediately after employment. The majority of BCW managers (72%) had no workplace OSH policy con-spicuously displayed for workers continued reference, and only 13.5% had established active workplace safety and health committee.

The study results indicated that 53.2% of BCW management provided appropriate and sufficient masonry work-related machinery, tools, and equipment. However,42% of masonry workers suggested for the supply of more tools and equipment. Majority (82.3%) of masonry workers indicated that they had pre-employment training on standard masonry work procedures, methods, and processes, including tools, equipment, and material handling techniques. Less than half (21.9%) BCW management had an established induction and refresher training programs for new and existing masonry workers. According to the survey, 45.3% of BCW managers closely monitored all masonry work operations, but only 31.3% promoted work-based productive dis-course, information exchange, and problem-solving across all administrative levels. Whereas the study indicated that 30.2% of MBC managers encouraged masonry workers' innovativeness and creativity in the execution of their daily tasks, 72% had no recognition and reward program for innovation, creativity, and overall performance of their masonry.

Less than half (22.3%) of BCW managers had undertaken workplace OSH audit, 70% had not established a risk register in BCW, and only 35.8% ensured adequate maintenance of workplace OSH environmental conditions. The study indicated that majority (83.3%) of masonry workers received First- Aid medical attention. In as much as OSH services were critical, the study re-vealed that only 7.8% of BCW managers had sufficient resource allocated for this purpose.

Existing Masonry Work Control Practices

The survey results suggested that the majority (84.4%) of masonry workers got clear job briefs and instructions on performance standards, as well as guidance from their supervisors. Majority (80.9%) of masonry workers were always assigned tasks based on their skills and competence, but Only 15.9% had a range of masonry work assignments to pick from. The study's findings revealed that fewer than half (28.4%) of masonry workers participated in task programming, scheduling, goal planning, and issue resolution. The majority (83.3%) of masonry workers took regular breaks across pre-determined job cycles, and 76% consistently completed their daily assignments on time. Majority (89.5%) of masonry co-workers and supervisors were always col-laborative, helpful, and supportive, and 82.2% always shared notable workplace incidents and accident information with their workmates and supervisors. The study results indicated that 9.8% of masonry workers actively participated in BCW risk management programs. The major-ity (70%) were not sure of their current job security with 41.7% always worried about being laid off.

Existing Government Policy on OSH Management

The study results revealed that only18.8% of BCW were regularly inspected by Directorate of Occupational Safety and Health Services (DOSH) field offices for OSH regulatory compliance and enforcement. Minority (18.7%) received DOSH's education, training and guidance in sup-port of BCW managers, masonry workers, and self-employed persons for improved OSH statu-tory compliance. Minority (4.6%) of respondents were aware of DOSH's programs on work-place OSH sensitization and outreach encouraging and promoting a safety and health culture in workplaces. Majority (90.6%) of respondents indicated being unaware of any standardized information platform offering periodic guidance and reference materials on OSH management in construction workplaces in Kenya. The study results also indicated that 92% of respondents were unaware of a building construction industry-wide OSH management performance recognition reward schemes in Kenya. The research found that 51.1% of the respondents believed that project owners and designers did not take an active role in workplace OSH management, not-withstanding their interest in ensuring the project's success.

Inferential Analysis

The research Spearman's rank correlation results (95% confidence) demonstrated a moderately favorable and statistically significant link between present masonry work control techniques and preventative management of WMSDs among masonry workers, rho (0.534) = 0.001, $p < 0.05$. The study results indicated a negligible but positive and statistically significant relation-ships between existing organization culture practices and masonry work control practices, rho (0.210) = 0.007, $p<0.05$. The study results also showed a negligible positive and statistically significant correlations between masonry work practices and government policy on OSH man-agement, rho (0.162) = 0.038, $p < 0.05$. The ordinal logistic

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regression analysis for the study (95% confidence) indicated that masonry work control practices had the highest positive odds ratio of 3.386, organization culture at1.405 and government policy on OSH at negative 0.839.

Hypothesis Testing

The study's null (Ho) hypothesis of the study was that there was no statistically significant link between masonry work control procedures and preventative management of WMSDs among masonry workers. However, the study results indicate moderate, positive, and statistically significant correlations between existing masonry work control techniques and preventative management of WMSDs among masonry workers, rho (0.534) = 0.001, $p < 0.05$. This implied that the findings did not support the null (Ho) hypothesis and was hence was rejected. The study re-sults supported the alternative (Ha) hypothesis, stating there was a statistically significant rela-tionship between existing masonry work control practices and preventive management of mus-culoskeletal disorders of masonry workers. The alternative hypothesis of the study was conse-quently accepted.

Dependable Variables

The study results indicated that 68.8% of masonry workers were exposed to work-related excessive vibrations. Less than half (49%) of masonry workers said their daily jobs needed constant overstretching of parts of their bodies, 47.9% said the repetitious nature of their job was too much for them, and 43.9% said they always used too much force to do daily chores. Majority (74%) of masonry workers' daily tasks were always emotionally demanding, and 57.8% always felt depressed, tired, and worn out during the execution of their masonry task assignments. The study 66.7% of masonry workers felt agonizing pain in their fingers, 62% in their arms and wrists, 59.4% in their neck, shoulders, and chest, 64.8% in their lower back, and 38.8% in their hip and knee muscles, tendons, and joints. However, 60% of BCW managers indicated to have not received any work-related complaints from masonry workers.

DISCUSSION

The descriptive and inferential analysis of the study data was carried out.

Descriptive Analysis

The study results revealed non-responses from workers over 39 years old, implying that age was a factor considered in recruitment of masonry workers. These results were consistent with Oakman et al. (2016) indicating that workers over 36 years of age were associated with increased WMSD risks and therefore unattractive employees for a physically demanding masonry work task. Slightly more than half (55%) masonry workers had worked for less than one year with the present company, a time regarded as too short for mastery of the organizational culture stand-ards, principles, and norms including underlying ideas and convictions that govern their work-place attitudes and behaviors (Groysberg et al., 2018; Shahzad et al., 2012).

The medical examination and record keeping of workers assisted the employer in workplace health surveillance as a preventive strategy for responsive action in case of need (Goch-feld,1992). It was also indicative of the employer's preparedness in providing occupation health service to workers, and determining whether the workers medical condition developed in the course of employment. The study results showed a minimal (15.6%) number of masonry work-ers underwent medical examinations before or immediately after employment.

The establishment of a workplace OSH policy was a statutory compliance requirement (OSHA,2007) for protection and promotion of workers health in workplaces. It outlines preven-tive and control measures for better workplace occupational diseases, accidents, work environ-ments and work organizations management (Yorio, Willmer & Haight,2014). The majority of BCW managers (72%) had no workplace OSH policy, implying lack of OSH management framework to the detriment of workers safety and health. The safety committee is an employer, employee and OSH experts' advisory group for promoting workplace relationships and aiding in implementation of quality safety and health program including identifying, assessing workplace risks, established a risk register, providing feedbacks on risk management practices, solving work-related problems and training workers on how to protect themselves and others (Mills& Lin,2004)). The study revealed that only 13.5% of BCW managers had established active workplace safety and health

committee, thus overlooking the important role in workplace safety and health management. Regular training and retraining of workers, especially on best work-place ergonomic practices prepares them to undertake tasks without risk to their safely and health resulting to increased productivity, decreased WMSDs, and overall absenteeism (Cecil & Ross, 2017; Pikaar,2012). Worker training enhances their knowledge, work skills, self- efficacy and boosts compliance with statutory requirements. The insufficient training programs unduly exposed workers to work-related risks leading to development of WMSDs.

Worker's performance recognition and award enhances the organizations culture of trust, work-er retention productivity and effectiveness (Itika,2011; Armstrong,2006; Bandura,1977) and). The study revealed that 72% of BCW managers had no recognition and reward program for innovation, creativity, and overall performance of their masonry, thus dampening their performance morale leading to job dissatisfaction and emotional stress. The study's findings revealed that employers and employees had not paid sufficient attention to the function of participatory ergonomics in preventing workplace safety and managing health.

This explained why only 28.4% and 9.8% of BCW managers involved workers in task execution planning and implementation and risk management programs respectively. Studies by Kon-ingsveld and De Looze (2017), EU-OSHA (2017), and Wilson (1995) emphasized the importance of worker engagement in applying ergonomic information, processes, and improvements that resulted in improved working conditions, safety, efficiency, effectiveness, morale, and comfort.

The study results indicated the regulator's insufficient involvement in supporting and promoting safety culture in BCW.The study findings indicated overwhelming regulators underperformance in providing sufficient and timely providing workplace supervision and compliance enforce-ment, employer and employees statutory compliance guidance and advice and OSH sensitiza-tion services. Other areas of concern included scarcity of OSH management information to but-tress workplace statutory compliance and industry-wide OSH performance recognition and re-ward to showcase, support and promote OSH best practices. The study results also noted the re-spondents concern regarding involvement of designers and client's involvement in workplace OSH management particularly in project design reviews with safety and health implications. The study revealed causes of underfunding of workplace activities to include lack of government incentives.

The study results revealed that only18.8% of BCW were regularly inspected by DOSH field of-fices for OSH regulatory compliance and enforcement. Minority (18.7%) received DOSH's ed-ucation, training and guidance in support of BCW managers, masonry workers, and self-employed persons for improved OSH statutory compliance. Minority (4.6%) of respondents were aware of DOSH's programs on workplace OSH sensitization and outreach encouraging and promoting a safety and health culture in workplaces.

Majority (90.6%) of respondents indicated being unaware of any standardized information platform offering periodic guidance and reference materials on OSH management in construction workplaces in Kenya. The study results also indicated that 92% of respondents were unaware of a building construction industry-wide OSH management performance recognition reward schemes in Kenya. The research found that 51.1% of the respondents believed that project owners and designers were not actively involved in workplace OSH management, despite their interest in the project's success.

Inferential Statistics

The study results indicated that the relationship between masonry work control practices were and preventive management of WMSDs of masonry workers was statistically significant, rho (0.534) = 0.001, $p < 0.05$. This meant that positive changes to masonry work control practices led to improvement in preventive management of WMSDs of masonry workers. The study's null (Ho) hypothesis was rejected, and the alternative hypothesis, that there was a statistically significant relationship between masonry work control methods and preventative management of WMSDs among masonry workers, was accepted. The study's ordinal logistic regression analysis revealed that a one-unit improvement in masonry work control procedures and organizational

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culture practices resulted in positive 3.386- and 1.405-unit changes in preventative oversight of WMSDs among masonry workers, respectively.

Dependable Variable

The investigation results of the dependent variable demonstrated symptomatic evidence of WMSDs of masonry workers operating in the BCW examined. The study findings indicated cause of these to include existing organization culture practices, masonry work practices and government policy on OSH management.

CONCLUSION

The application of masonry work control practices created a safe, healthy, respectful, and pro-ductive environment for masonry workers in BCW. Promoting open communication, transpar-ency, and collaboration in BCW ensured the well-being and success of workers. This approach supported prioritization workers safety and health by providing necessary training, and fostering a culture of accountability and mutual respect in workplaces. It promoted progressive improve-ment of working conditions by adopting and implementing ergonomic best practices to prevent work-related accidents and diseases, thus enhancing productivity and job satisfaction for mason-ry workers. This was consistent with the OSH Act (2007) goals of developing an enabling work-place implementation structure and programs supportive of a work environment that ensured masonry work activities were undertaken and completed safely and healthfully. The findings were also consistent with the complexity and other supporting theories. The masonry work sub-system operating within the main BCW management system guided as by workplace leadership and management framework. This ensured that masonry workers executed tasks was without harm to their safety and health for the benefit of the whole.

The study results indicated that employer in most BCW investigated failed to establish work-place OSH policy, set up safety committees, organize appropriate worker training programs, embrace participatory ergonomics including recognizing and awarding workers for their per-formance. The findings also revealed that the shortage of OSH enforcement officers and spe-cialists led to inadequate oversight, contributing to poor adherence to safety standards and an increased prevalence of unsafe practices and work-related musculoskeletal diseases among ma-sonry workers. The deficiencies in various aspects of OSH management including the regula-tor's adequate statutory compliance guidance, advice and enforcement, and access to OSH in-formation underscore the need for improved compliance with OSH regulations. Addressing these gaps through enhanced oversight, regular audits, and the development of standardized in-formation platforms is crucial for improving safety practices and reducing Work-related muscu-loskeletal diseases in the industry.

However, the complexity theory brings forth new thinking for leaders to give up strict control of inefficient and ineffective systems, allowing for effective leadership that promotes strong values, beliefs, and open communication. In essence, complexity theory assists organizations in viewing their management as a Complex Adaptive System (CAS), capable of self-organizing its structure and exchanging information, energy, and various other resources within the environ-ment, as well as converting these resources into action. The Complexity Theory offers a fresh perspective of creating a "culture of trust" that welcomes diversity, embraces innovation, and fosters collaboration to address emerging workplace OSH management challenges.

RECOMMENDATIONS

For improved performance in masonry work control practices for preventive management of WMSDs of masonry workers, it was recommended that workplace stakeholders embrace and mainstream participatory ergonomics management. Existing masonry work organizations management be strengthened and encourage to ensure their members participate in workplace risk management activities. Existing building contractors' organization to be encouraged and ensure that their members embrace participatory ergonomics management in their workplaces as a viable preventive approach to reduced WMSDs of masonry workers.

The OSH regulator, construction contractors, and masonry worker organizations will organize regular sector-specific workplace ergonomic management training and sensitization

programs for enhanced masonry work control and preventative management of masonry workers' WMSDs. The OSH regulator, employers and masonry workers be encouraged exploit emerging digital platforms for efficient and effective workplace-related OSH information sharing. The OSH regulator to organize a sector-specific building construction industry annual performance recognition and award program for promoting workplace ergonomic management best practices. The existing government policy to be reviewed to provide for workplace OSH compliance self- assessment and economic incentives. Further research to be conducted on the relationship between workplace motivational behaviour and preventive management of WMSDs of masonry workers.

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