

ANALYSIS OF OCCUPATIONAL HEALTH ISSUES AMONG MALE AND FEMALE FRONTLINE WORKERS IN APPAREL INDUSTRY: SPOTLIGHT ON FEMALE WORKERS

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Abstract. Garment factory workers are exposed to a plethora of occupational hazards, which can lead to chronic health issues. This study aimed to conduct a comparative analysis of occupational health issues, focusing on MSK disorders and psychological stress, among male and female frontline workers in the apparel industry. The research sought to assess the prevalence and severity of these health issues and explore the differences in how male and female workers experience these conditions. Furthermore, gender sensitive recommendations were suggested to overcome or minimize the identified health issues, specifically targeting the female workforce. The study collected data through questionnaire surveys across three garment factories in Sri Lanka. The findings revealed the significant gender-based differences in MSK disorders and psychological stress. Female workers reported a higher prevalence and severity of MSK pain and psychological distress compared to their male counterparts. Additionally, the quality of life among female workers was found to be comparatively lower. This study contributes to a better understanding of occupational health from a gender perspective, informing policymakers, industry leaders, and occupational health professionals on creating safer and more equitable workplaces.

Keywords. Occupational Health, Female Workers, Musculoskeletal Disorders, Psychological Stress, Gender Differences.

1. Introduction

In the realm of occupational health, it is essential to examine the unique challenges and experiences faced by different segments of the workforce. Among these, the health and well-being of women in the workplace have emerged as an area of increasing concern and interest. Women's participation in the workforce has significantly increased over the past decades (ILO, 2017; World Bank, 2023; Sri Lanka, Gender Data Portal), and a substantial number of female workers contribute to various industries and professions of the global workforce (Winkler et al., 2022). This demographic shift has highlighted the need to understand and address their specific health and safety concerns in the workplace.

The practical problem of occupational health issues of female workers can vary compared to those of men across different contexts and industries. However, some common practical challenges that females face are as follows: workplace hazards, ergonomics and workstation design, gender-based discrimination, work-life imbalance, occupational health services and resources and reporting and access to care (European agency for health and safety at work, 2013). Female workers may encounter specific hazards that are more prevalent in certain industries or job roles. Workers in such industries may be more prone to musculoskeletal injuries due to physical demands and ergonomics/workstation design (Morrison et al., 2024). Workstations and equipment are often designed with the average male body size and strength. Ill-fitting PPE, uncomfortable seating, and tools designed for larger hands can contribute to physical strain and injuries (Peninsula Business Service, 2002). On the other

hand, discrimination and gender bias in the workplace, such as unequal treatment and a lack of support for work-life balance, can lead to increased stress and negative health outcomes (Tasnim et al., 2017). Balancing work and personal life responsibilities can be particularly challenging for female workers (Manimekalai, 2017), especially those with caregiving responsibilities. The lack of flexible work arrangements (White et al., 2020), inadequate support for maternity leave (Johnson, 2022) and limited access to childcare facilities (World Bank, 1988) can contribute to elevated stress levels and burnout risks. Additionally, barriers in accessing appropriate occupational health services and resources and underreporting occupational health concerns can result in delayed or inadequate treatment and support for workers (Mubita et al., 2023).

Occupational health problems and illnesses that specifically affect female workers can vary depending on the industry, occupation, and individual circumstances. The textile and wearing apparel industry has been one of the largest gross export earners in Sri Lanka since 1986 and also the country's net foreign exchange earner since 1992 (Ministry of Industries, 2021). However, there are around 300 manufacturers of apparel in the sector, providing direct employment for about 350,000 people, which includes a substantial number of women (Ministry of Industries, 2021). MSK issues, repetitive movements, eye strain due to prolonged focus, stress related to high production quotas and nutritional deficiencies are some of the common issues faced by workers related to the apparel sector (Talapatra & Rahman, 2016). According to Thatshayini et al. (2018), common occupational problems for apparel industry workers in the Northern province would be excessive noise, repetitive work, stress, chemical hazards (cotton dust) and an imbalanced diet. It is evident that there is a lack of studies and comparative analysis targeting female workers in the Sri Lankan context related to the apparel sector. By searching into these complexities, there is a need for a study to comparatively analyze the issues among male and female workers and specifically explore the interventions required to minimize or address the health issues of female workers in the Sri Lankan apparel manufacturing sector. Through a comprehensive examination of existing literature, empirical research, and real-world case studies, researchers and stakeholders should gain knowledge surrounding occupation-related issues faced by female workers. Such research studies will help to scope a review to map out what is currently known about women's health in the context of the workplace and look at correlations between women's health, illnesses, and capacity for work in comparison to males.

Accordingly, this study aims to "compare the prevalence and severity of MSK disorders and psychological stress between male and female frontline workers in the apparel industry, with the goal of developing gender sensitive recommendations to enhance workplace health and safety for female workers". The study based on four objectives., which are identify sex differences, risk factors and gender roles related to musculoskeletal diseases and psychological problems among frontline workers with an especial emphasis on the Apparel industry, to assess and compare the prevalence and severity of MSK disorders among male and female frontline workers in the apparel industry, to assess and compare the levels of psychological stress experienced by male and female frontline workers in the apparel industry, to develop gender-sensitive recommendations that can mitigate MSK disorders and psychological stress and promote a safe and healthy work environment for frontline workers with the special emphasize of female workers. This study employed a descriptive cross-sectional design to investigate occupational health outcomes among 120 frontline apparel

workers. The study focused on the 25-55 age demographic with a minimum of 5 years of work experience. Data were collected using a socio demographic questionnaire, a specialized MSK questionnaire and a work stress questionnaire to evaluate the prevalence and severity of physical and mental health challenges.

Although several international studies have examined occupational hazards and work-related health issues among workers in the apparel industry, limited research has specifically focused on frontline workers in the Sri Lankan apparel sector, particularly from an occupational safety and health perspective. Previous studies have given insufficient attention to the combined physical and psychological hazards experienced by frontline employees who are directly involved in production activities. Sri Lanka was selected because the apparel sector is one of the country's largest economic contributors and employs a significant proportion of the workforce, with a high representation of female workers. Female workers were specifically considered due to their greater participation in frontline operational roles and their potential vulnerability to both physical strain and psychosocial stressors related to work demands and work-life balance. Comparing male and female workers helps to identify gender-based differences in occupational hazard exposure and health outcomes, which is important for developing targeted interventions and workplace safety policies.

2. Methodology

This study employed a descriptive cross-sectional mixed-methods research design to examine musculoskeletal disorders (MSDs) and psychological well-being among garment factory workers. Cross-sectional designs are commonly used to assess the prevalence of health outcomes at a single point in time, while mixed-method approaches enable a more comprehensive understanding by integrating both quantitative and qualitative data (Creswell & Creswell, 2018; Setia, 2016). The study was conducted in three garment factories located in Colombo and Gampaha districts. A total of 120 participants were selected using quota sampling to ensure balanced gender representation (59 males and 61 females) and adequate sectional coverage. Eligible participants were aged 25–55 years and had at least five years of continuous work experience.

Data were collected using a structured, self-administered questionnaire consisting of three components: a socio-demographic questionnaire, an MSK assessment tool, and the Work Stress Questionnaire (WSQ) to measure psychological stress. A validated instrument designed to assess perceived work-related stress and its impact on individuals (Holmgren et al., 2009). The instruments were developed in English, Sinhala, and Tamil; however, responses were obtained only in Sinhala and English. Participants were asked to provide recommendations for mitigating work-related MSK disorders and psychological stress, and based on their answers and literature findings, recommendations were formulated.

Quantitative data were analyzed using SPSS software, applying descriptive statistics and bar charts to identify patterns, prevalence rates, and gender differences. Qualitative responses were analyzed through thematic analysis. Ethical considerations, including informed consent, confidentiality, and voluntary participation, were strictly maintained throughout the study. The research process is mentioned in Figure 1.

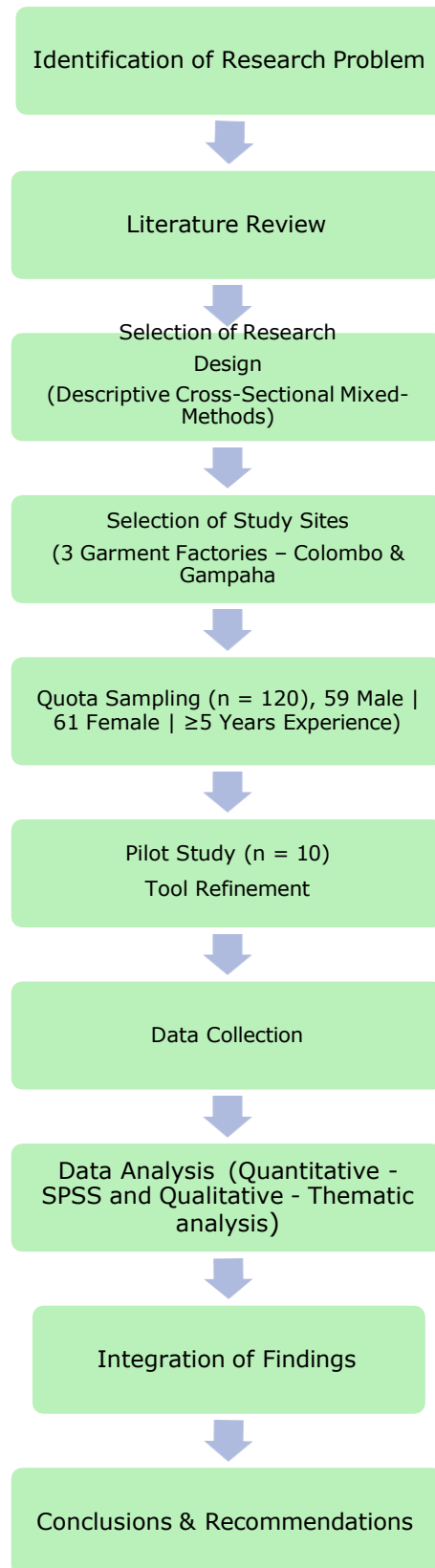


Figure 1, Research process.

3. Results

3.1. ANALYSIS OF SOCIO DEMOGRAPHIC DATA.

The study analyzed a gender-balanced sample of 120 frontline workers, comprising 59 males (49.2%) and 61 females (50.8%). The majority of respondents fall within the 25–35 age bracket (54.2% of males and 57.3% of females). Marriage is the predominant status among respondents, though it is notably higher among females (73.7%) compared to males (52.5%). The educational level is largely uniform across genders, with the vast majority having completed High School. A smaller segment holds higher qualifications, such as diplomas or degrees, while roughly one-quarter of the sample completed only elementary education.

3.2. ANALYSIS OF MSK DISORDERS.

3.2.1. Occupational Roles and Task Distribution

The study represented a diverse range of roles. While overall occupational hazard exposure seems similar across genders, distinct patterns can be identified.

- **Gender-Specific Tasks:** Male workers were significantly more likely to engage in heavy lifting or pulling (46.6% vs 23.3%).
- **Ergonomic Risks:** Conversely, female workers reported nearly double the rate of working in uncomfortable postures (62.2% vs 30.5%) and experienced higher exposure to mechanical vibrations (53.3% vs 40%).
- **Shared Hazards:** Both genders frequently engaged in repetitive movements, bending, and prolonged sitting or standing at high operational speeds.

3.2.2. Analysis of MSK disorders.

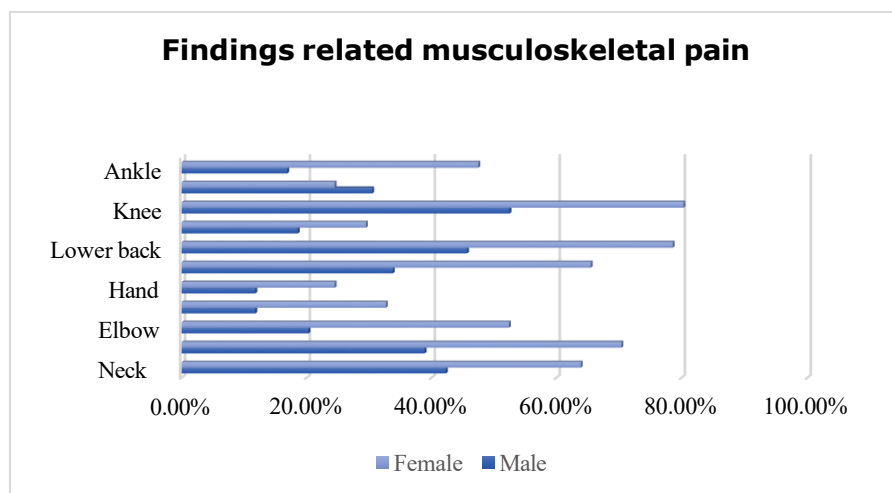


Figure 2, Prevalence of MSK pain.

The data reveal a significantly higher prevalence of musculoskeletal pain among female workers compared to their male counterparts, interestingly. The most affected areas for females are the knee (80.3%), lower back (78.6%), and shoulder (70.4%). For male workers, the knee (52.5%), lower back (45.7%), and neck (42.3%) are the most frequently cited areas of discomfort, likely related to tasks involving heavy lifting and material handling. However, the widest gaps in prevalence occur in the upper back (65.5% in females vs. 33.8% in males), elbow (52.4% vs. 20.3%), and ankle (47.5% vs. 16.9%). These findings highlight that female workers are twice as likely to experience upper-body and lower-extremity strain as males in the same industrial setting. Anyway, the knee and lower back are the leading sites of pain for both genders. In summary, this study demonstrates a critical gender disparity in occupational health within the apparel industry, as female workers exhibit significantly higher rates of musculoskeletal pain compared to males.

3.2.3. Assess the intensity of pain.

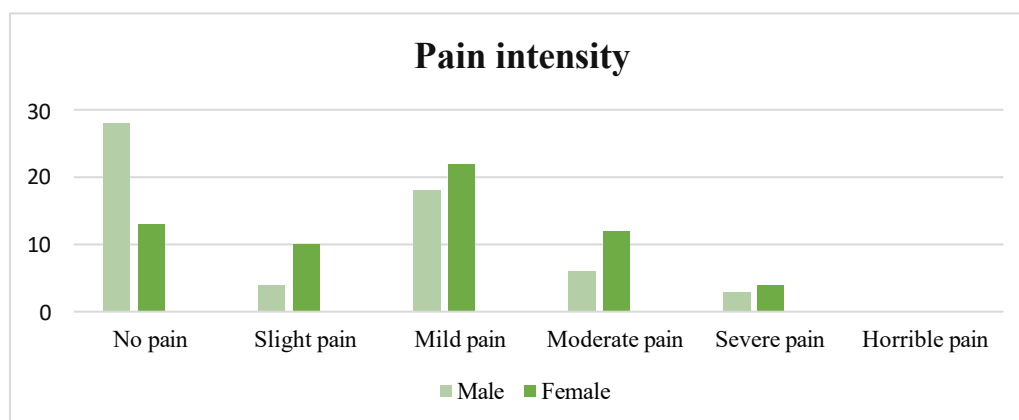


Figure 3, Pain intensity.

The data shows a clear gender-based divergence in how pain is experienced and reported.

Overall Trend: The distribution suggests that female workers experience a higher overall burden of pain, with the majority shifting toward the symptomatic end of the scale. In contrast, the male population is more heavily concentrated in the asymptomatic category.

3.2.4. Analysis of QOL status related to MSK.

While both groups reported similar levels of sleep disturbance and social interference, significant differences emerged in work-related and emotional outcomes:

- Psychological Distress: The most striking disparity is that female workers reported nearly double the level of anxiety or low mood due to MSK symptoms compared to males.
- Workplace Interference: Female workers indicated that joint and muscle symptoms significantly interfered with their work and daily routines much more than male workers.
- Physical Exhaustion: Post-shift pain and fatigue were consistently higher in females, compared to males.
- Overall Burden: When asked how much symptoms bothered them overall in the last four weeks, females reported a higher burden than males.

3.3. ANALYSIS OF PSYCHOLOGICAL QUESTIONNAIRE.

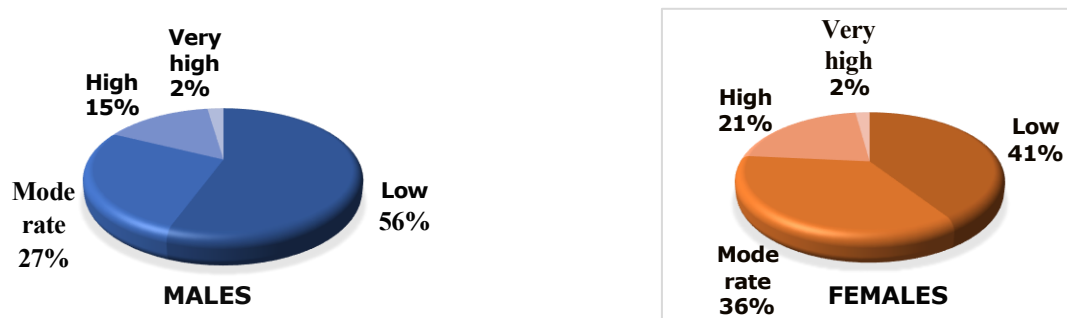


Figure 4, Overall stress levels of both male and female workers.

The Work Stress Questionnaire (WSQ) developed by Kristina Holmgren, is a tool designed to assess the stress experienced by individuals in their work environment. It includes a range of questions that cover various aspects of work life that can contribute to stress, such as workload, control over work, interpersonal relationships at work, organizational culture, work-life balance, and more. The WSQ questionnaire has four sections. The results from the Influence at Work section indicate that both genders feel a relatively high level of stress regarding their work pace and decision-making influence. However, females scored slightly higher than males. The second category detects the indistinct organization and conflicts. The data shows that females generally report higher average scores, particularly involving conflicts in the workplace. In contrast, males scored higher only on decision making. Overall, the results suggest that female respondents perceive or experience these organizational conflicts more intensely than their male counterparts.

The data on individual demand and commitments reveal that female respondents generally report higher levels of work engagement and extended working hours, with a notably higher average of 4.1 for working after ordinary hours compared to 3.3. for males. However, both genders experience a moderate level of sleep disturbance due to work-related thoughts. Overall, the results suggest that women tend to carry a heavier burden regarding work-life boundaries and overtime. The last section, leisure time interference, indicates that female respondents experience greater difficulty balancing social obligations, finding time for family and friends, compared to their male counterparts. Interestingly, males report slightly more difficulty finding time for their own recreational activities (2.1 vs 1.9). Overall, the results suggest that work commitments significantly impact the social lives of female workers more than male workers. Across all four domains, a consistent pattern emerges where female respondents generally report higher levels of work-related stress.

4. Recommendations

The recommendations presented in this study were primarily derived from the findings obtained through the questionnaire survey. Therefore, recommendations were developed by interpreting these findings in relation to existing occupational safety and health practices and supported by relevant literature. The importance of considering the stressors that are unique to employed women is that an increased understanding of the specific needs of working women. The organizations should accept the gender stereotype, where women are viewed as the weaker sex and gender sensitivity in the planning, implementation, and evaluation phases of all policies and activities. Additionally, organizations should prioritize gender equality by acknowledging inequalities because there can be hidden discrimination if approaches are based on male norms.

In order to provide better health and safety for female workers in the apparel industry, the organization could develop ergonomically designed workstations, considering the average measurements of female workers. For example, adjustable chairs, tables, and equipment. (Noopur et al., 2017; Vellitin et al., 2012; Avinent et al., 2021). Provide specialized tools and equipment that are easier to handle and manipulate, considering the generally smaller hand size and grip strength of women. This can reduce the strain injuries and other MSK issues (Asuquo et al., 2021; Enobong et al., 2021; Mahmud et al., 2021). Provide training programs that include the particular MSK hazards that female employees encounter. Include incorporated posture correction, safe lifting practices, and muscle-strengthening workouts (Kim et al., 2015; Babydov et al., 2023). This includes providing on-site healthcare services, including access to physiotherapy, counseling, and women's health clinics (Maraj et al., 2018; Korentang et al., 2022), to address both MSK and psychological concerns. Educate female workers on health issues more prevalent in women, such as osteoporosis and other conditions that could exacerbate MSK problems. Developing educational programs and promoting self-care practices tailored to the unique health needs of female workers would help achieve that goal. Empowering women with knowledge and skills to proactively manage their physical and mental health, both at work and in their personal lives, will give better outcomes (Kermode et al., 2007). Provide psychological support and resources. Provide access to mental health resources, including counseling services, stress management workshops (Greenwood et al., 2022), and so on. Moreover, organizations can establish support groups where female workers can share their experiences and coping strategies. This can help in reducing feelings of

isolation and stress. Offer flexible work hours or part-time options to help female workers manage family responsibilities and work life balance (Charlotte et al., 2022; Christopher et al., 2000). Offer parental support for working mothers, such as on-site daycare centres or collaborations with neighbourhood daycare providers. Offer maternity leave, paternity leave, and accommodations for pregnant workers. Provide physical health programs (Mohebbi et al., 2019; Coutler et al., 2009), such as regular physical activity by providing fitness programs, yoga classes, or simple stretching exercises that can be done during breaks. Focus on exercises that strengthen muscles and improve flexibility. Offer workshops on nutrition and healthy lifestyles, also useful as proper nutrition can contribute to both physical and mental health. Train managers and supervisors in gender-sensitive management practices (Ranjith et al., 2023; Wang et al., 2021). This includes understanding the unique challenges faced by female workers and fostering an inclusive and supportive work environment. Provide career development opportunities for women. Encourage them to take on leadership roles and provide training that builds confidence and skills. Conduct regular surveys to gather feedback from female workers on their workplace experiences, including MSK and psychological concerns (Kristina et al., 2005). Use this feedback to continually improve workplace conditions and policies. Involve female workers in the decision-making process, particularly in matters related to health and safety. This can ensure that implemented measures address their specific needs effectively. Additionally, implement anti-harassment policies (Unnikrishnan et al., 2010; Lindsey et al., 2023). Educate all employees about these policies and establish clear reporting mechanisms. Finally, society as a whole must adapt in order for men and women to be able to enjoy better health in general, and better occupational psychosocial health in particular, lower stress and higher well-being. In this regard, breaking down gender preconceptions requires a significant amount of work. And it has to begin at the beginning, inside the framework of the family and the school. Therefore, it appears that gender equality education for parents, educators, and society at large is required in order for the children of today to grow up to be women and men who, regardless of gender, will share their responsibilities at home and at work.

5. Conclusion.

In conclusion, frontline female workers in the apparel industry face higher risks of chronic musculoskeletal pain and psychological distress than male workers despite having similar levels of experience. The study identifies that while males are more exposed to heavy lifting, females deal with more frequent uncomfortable postures and mechanical vibrations, leading to increased functional interference in daily life. The elevated stress scores among females regarding work-to-leisure interference and organizational demands highlight a dual burden of professional and personal stressors. Despite these high levels of physical and mental strain, the low rate of regular medication and medical consultation suggests a critical gap in workplace healthcare utilization. These findings mandate the development of targeted occupational health strategies that prioritize ergonomic redesign and mental health resources specifically for the female workforce.

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