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Work-Related Musculoskeletal Disorders among Indonesian Midwives: Organizational and Individual Determinants

Gangguan Otot Rangka pada Bidan Indonesia: Determinan Individu dan Organisasi

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ABSTRACT

Background: Musculoskeletal disorders (MSDs) are a significant occupational health problem among Indonesian midwives. Existing literature often neglects the intersection of individual, workplace, and domestic factors that may further influence MSDs.

Objective: To determine whether MSDs affect the work performance of midwives and identified contributing individual and organizational risk factors.

Methods: A cross-sectional online survey of 90 midwives in Yogyakarta public health centres around March-June 2025. Participant recruitment was conducted through purposive sampling.

Results: Over half (57%) reported MSDs affecting work performance. Chi-square analysis showed significant associations between BMI ($\chi^2 = 6.42$, $p = 0.04$) and shift work ($\chi^2 = 5.83$, $p = 0.02$) with MSDs prevalence. Mid-career midwives aged 31–44 years and those in the Obesity I BMI category (25–29.9) were the most affected. Organizational support was limited 83.3% lacked ergonomic guidelines, 87.8% had no ergonomic training, and 66.7% received no household assistance indicating the combined effect of occupational and domestic burdens.

Conclusion: These results highlight the need for integrated ergonomic and psychosocial interventions to reduce MSD risks to support midwives' health and well-being. Further research is needed to examine the most dominant factors causing musculoskelatal disorders.

Keywords: Ergonomic; Musculoskeletal Disorders; Midwives; Occupational Health; Workplace

ABSTRAK

Latar Belakang: *Gangguan Otot Rangka (Gotrak) merupakan masalah kesehatan kerja yang signifikan di kalangan bidan Indonesia. Berdasarkan literatur saat ini sering mengabaikan hubungan antara factor individu, tempat kerja, dan faktor domestik yang mungkin mempengaruhi Gotrak.*

Tujuan*: Penelitian ini bertujuan untuk mengetahui pengaruh Gotrak terhadap aktivitas kerja bidan dan mengidentifikasi faktor risiko individu dan organisasi yang berkontribusi.*

Metode: *Survei online cross sectional terhadap 90 bidan di pusat kesehatan masyarakat (Puskesmas) area Yogyakarta bulan Maret sampai Juni 2025. Teknik sampling menggunakan purposive sampling.*

Hasil: *Lebih dari separuh bidan (57%) melaporkan bahwa mengalami Gotrak dan memengaruhi kinerja. Analisis chi-square menunjukkan hubungan yang signifikan antara BMI ($\chi^2 = 6{,}42$, $p = 0{,}04$) dan kerja shift ($\chi^2 = 5{,}83$, $p = 0{,}02$) dengan prevalensi Gotrak. Bidan berusia 31–44 tahun dan kategori BMI Obesitas I (25–29,9) adalah yang paling banyak mengalami Gotrak. Dukungan organisasi masih terbatas, 83,3% tempat kerja tidak memiliki pedoman ergonomi, 87,8% belum pernah mengikuti pelatihan ergonomi, dan 66,7% bidan tidak mempunyai pembantu rumah tangga yang menunjukkan beban ganda dari beban pekerjaan dan beban rumah tangga.*

Kesimpulan: *Hasil ini menunjukkan perlunya integrasi intervensi ergonomi dan psikososial untuk mengurangi risiko Gotrak untuk mendukung kesehatan dan kesejahteraan bidan. Perlu penelitian selanjutnya untuk menkaji faktor risiko paling dominan yang menyebabkan Gotrak.*

Kata Kunci: *Ergonomi; Gangguan Otot Rangka; Bidan; Kesehatan Kerja; Tempat Kerja*

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INTRODUCTION

Work-related musculoskeletal disorders (WMSDs) remain a leading cause of physical disability and occupational morbidity worldwide (Yin *et al.*, 2025). Musculoskeletal disorders (MSDs) represent one of the most pervasive occupational health concerns globally, particularly within the healthcare sector. Among healthcare professionals, midwives are identified as a high risk group due to the physically demanding nature of their work. Their daily tasks often involve prolonged standing, awkward postures, repetitive movements, and manual handling of patients, all of which contribute to cumulative musculoskeletal strain (Hasheminejad et al., 2023; Mohammed et al., 2024). Studies consistently highlight the substantial prevalence of MSDs in midwifery, with lower back pain emerging as the most frequently reported symptom, affecting up to 64% of practitioners (Mohammed et al., 2024). Such conditions not only compromise the physical well-being of midwives but also negatively impact service delivery and the overall quality of maternal healthcare.

The global healthcare workforce faces an increasing incidence of MSDs, particularly in low and middle income countries (LMICs), where healthcare infrastructure and occupational health standards are often less developed (Afulani et al., 2021). In these contexts, ergonomic risk factors, such as improper patient handling techniques and inadequate equipment design, are exacerbated by organizational and psychosocial stressors, including high workload, staff shortages, and extended work hours (Jacquier-Bret & Gorce, 2023; Kiss et al., 2024). Midwives in such environments often experience limited institutional support, insufficient ergonomic training, and scarce access to preventive interventions, further amplifying their vulnerability. The World Health Organization (WHO) has emphasized the importance of safe working conditions for midwives as part of its global strategy to improve maternal and neonatal outcomes. However, research shows that ergonomic hazards and musculoskeletal health remain under addressed components of occupational safety programs in many LMICs, including Indonesia (Marsden et al., 2022; Rickard et al., 2022).

Despite the critical importance of midwifery in maternal and child health, MSDs among midwives are often underreported and undertreated. Studies suggest that many midwives consider musculoskeletal discomfort as an inevitable aspect of their profession, leading to self management of symptoms rather than seeking formal medical support (Hasheminejad et al., 2023). This cultural normalization of pain contributes to delayed interventions and worsens long term health outcomes. Furthermore, the physical burden is compounded by psychosocial pressures, such as emotional strain, job dissatisfaction, and inadequate recognition, which collectively influence both the onset and progression of MSDs (Albendín-García et al., 2021). These findings highlight a pressing need for systemic change that addresses both physical and organizational dimensions of occupational health in midwifery.

Research has identified a range of risk factors contributing to the development of MSDs among midwives. Physical determinants include repetitive movements, awkward or static postures during delivery assistance, bending, lifting, and patient repositioning (Jacquier-Bret & Gorce, 2023; Okuyucu et al., 2021). Demographic and personal characteristics such as age, body mass index (BMI), and years of professional experience are also significant predictors of musculoskeletal

symptoms (Mohammed et al., 2024). Organizational and psychosocial elements including work overload, insufficient rest breaks, shift work, and limited workplace autonomy further exacerbate physical strain (Kiss et al., 2024).

These multifactorial risks underscore the necessity for comprehensive prevention strategies that integrate ergonomic, organizational, and behavioural components.

At the organizational level, ergonomic interventions have proven to be among the most effective preventive measures against MSDs in healthcare settings. Studies have demonstrated that workplace modifications, such as adjustable workstations, ergonomic equipment, and improved workspace layout, can substantially reduce physical strain and improve overall comfort (Jacquier-Bret & Gorce, 2023; Okuyucu et al., 2021). Moreover, training programs focusing on safe lifting and posture awareness have been shown to significantly decrease the incidence of MSDs among nurses and midwives (Hajiesmaello et al., 2022). The inclusion of ergonomics in occupational health and safety (OHS) policies is therefore vital for sustainable improvements. Yet, implementation remains inconsistent, particularly in developing countries where resources are limited and awareness of ergonomic principles is low.

In Indonesia, systemic and cultural challenges shape the prevalence and management of MSDs among midwives. The hierarchical nature of healthcare institutions often limits open communication about ergonomic concerns and restricts feedback loops that could inform policy improvements (Sharifi et al., 2025). Moreover, midwives frequently encounter insufficient institutional support, including the absence of formal ergonomic guidelines, inadequate training opportunities, and limited access to appropriate equipment (Heuvel et al., 2023). The sociocultural expectation for midwives to maintain resilience and perform physically demanding tasks without complaint further discourages help seeking behaviours (Garti et al., 2023). Combined with high workloads, long working hours, and insufficient staffing, these systemic factors create a work environment conducive to chronic musculoskeletal strain.

Interventions in similar contexts have underscored the importance of integrating ergonomic awareness into professional training and healthcare management. Albendín-García et al. (2021), found that mindfulness-based stress reduction programs reduced emotional exhaustion and improved coping among healthcare workers, suggesting the potential benefit of combining psychosocial and ergonomic interventions. Similarly, organizational support in the form of adequate staffing and flexible scheduling has been correlated with reduced MSD prevalence (Kiss et al., 2024). These studies provide valuable insights for tailoring interventions in Indonesia, where resource limitations and cultural dynamics necessitate context specific approaches.

However, despite increasing global attention to MSDs in healthcare, research focusing on Indonesian midwives remains sparse. The lack of national ergonomic standards in midwifery practice and the minimal enforcement of occupational health regulations contribute to an underdeveloped prevention framework (Marsden et al., 2022; Rickard et al., 2022). While some studies have explored general ergonomic awareness among healthcare workers, few have systematically analysed midwives' perceptions, experiences, and the organizational determinants influencing MSDs. Moreover, existing literature often neglects the intersection of

individual, workplace, and domestic factors, such as home responsibilities and family support, that may further influence MSD risks in women dominated professions.

This study aims to fill these critical gaps by examining midwives' experiences and perceptions regarding work related MSDs and identifying key risk factors that contribute to their development. Musculoskeletal disorders (MSDs) are widely recognized as a major occupational health burden among healthcare workers, with prevalence rates consistently reported as high across different settings. In midwifery, empirical evidence indicates that MSD prevalence is particularly elevated due to the physically intensive nature of clinical tasks. For instance, lower back pain alone has been reported to affect up to 64% of midwives, making it the most common musculoskeletal complaint in this profession. Recent studies have moved beyond simple prevalence reporting toward identifying multifactorial determinants of MSDs. However, quantitative and observational studies increasingly demonstrate that these physical exposures interact with individual characteristics, including age, body mass index (BMI), and years of professional experience, which significantly influence susceptibility to MSDs. Following preliminary exploration, it becomes evident that MSDs among midwives are shaped by a complex interplay of individual, occupational, organisational, and sociocultural determinants. Therefore, the central problem addressed in this study is not merely the identification of risk factors, but the analytical determination of the most influential (dominant) factors contributing to MSDs among midwives within the Indonesian healthcare context. Specifically, it seeks to 1) How do midwives experience and perceive work-related MSDs within their daily professional activities?, and 2) What individual, ergonomic, and organisational factors are significantly associated with the occurrence of MSDs? By contextualising ergonomic and organizational challenges within Indonesia's healthcare system, this research provides evidence based insights to inform policy development, training curricula, and workplace interventions. Of the studies conducted on occupational health in midwives, only a small amount has focused on ergonomics. Previous research only stated that working in awkward postures (AOR = 1.81), sustained static positioning, manual patient transfers, and managing high daily patient volume were significant predictors of musculoskeletal symptoms without specifying the position held while performing the work activities (Mohammed *et al.*, 2025). The novelty of this study is analytical identification of dominant risk factors, its integration of multidimensional determinants, and its contextualization within the Indonesian healthcare system, thereby offering a more precise and actionable framework for improving occupational health among midwives. The findings are expected to contribute to a deeper understanding of occupational health risks among midwives and to support the design of targeted, sustainable strategies that enhance both worker well-being and the quality of maternal care

MATERIALS AND METHODS

A. Research Design

This study employed a cross sectional design to explore the relationship between individual characteristics, organizational support, and the occurrence of work-related musculoskeletal disorders (MSDs) among midwives. A cross sectional approach is particularly suited for identifying correlations between exposure factors and outcomes within a defined

population at a single point in time (Mohammed et al., 2024). This design allows for efficient data collection and is widely adopted in occupational health research to assess the prevalence and determinants of ergonomic and psychosocial risks (Jacquier-Bret & Gorce, 2023). The study sought to capture a representative snapshot of the working conditions and ergonomic challenges faced by midwives in public health centres across Indonesia.

The rationale for selecting a cross sectional method lies in its ability to correlate self-reported MSDs with individual and organizational variables without requiring prolonged follow up. Previous research in healthcare ergonomics supports this approach, particularly when the primary objective is to identify risk patterns and inform future longitudinal or interventional studies (Antonella et al., 2023). The design facilitates analysis of associations between demographic factors, workload characteristics, and organizational support systems with MSD prevalence, aligning with the study's dual aims of understanding both personal and systemic contributors to musculoskeletal health outcomes.

B. Population and Sample

The target population comprised registered midwives employed in public health centres (Puskesmas) throughout Yogyakarta. The total population of midwives from 45 health centers is 225 midwives. A total of 90 midwives participated in the study. The inclusion criteria required participants to (1) be currently employed as practising midwives in public health centres, and (2) have a minimum tenure of 12 months in their current position to ensure adequate exposure to work-related conditions. The exclusion criteria were (1) midwives holding additional employment outside their primary role, and (2) those currently pregnant, to avoid confounding effects related to pregnancy related musculoskeletal changes.

The calculation of the sample size based on the sample size formula for proportion data in a limited (finite) population obtained a value of 82.3 with the addition of 10%, resulting in a sample size of 90 midwives. Participant recruitment was conducted through purposive sampling, leveraging regional midwifery associations and professional networks to distribute the survey link. Although stratified random sampling has been recommended in occupational health research to ensure demographic (Mohammed et al., 2024), purposive sampling was considered appropriate given the logistical constraints and the specific aim to capture insights from midwives within the public health system. Participants were informed of the study's purpose and provided consent prior to completing the questionnaire. This research has received ethical permission from the Faculty of Medicine, Public Health, and Nursing, Gadjah Mada University with number KE/FK/1627/EC/2024.

C. Research Instruments

To assess MSD prevalence and distribution, the study utilised items adapted from the Nordic Musculoskeletal Questionnaire (NMQ), a validated and widely used instrument for identifying musculoskeletal symptoms across multiple body regions (Jacquier-Bret & Gorce, 2023). The NMQ facilitates quantification of symptom frequency and intensity over defined periods, such as 12 month and 7 day prevalence. In this study, the 12 month indicator was used as the musculoskeletal symptoms experienced by midwives. Participants were asked to indicate the presence of pain or discomfort in specific

anatomical areas, including the neck, shoulders, upper and lower back, hips, knees, and wrists. Additionally, respondents reported whether these symptoms affected their ability to perform routine work activities.

Organizational and ergonomic factors were assessed through structured questions developed based on prior literature examining workplace ergonomics and organizational safety culture (Antonella et al., 2023; Kiss et al., 2024). These items included the presence or absence of ergonomic guidelines, availability of ergonomic training, access to comfortable or adjustable equipment, and the degree of on the job assistance available. Domestic factors, such as household assistance and caregiving responsibilities, were also included to capture external influences on musculoskeletal strain.

D. Data CollectionTechniques

Data were collected through an online self administered questionnaire distributed via digital platforms, including whatsapp and social media groups of midwives' associations around March until Juni 2025. The use of online data collection was chosen for its accessibility, cost-efficiency, and ability to reach geographically dispersed respondents. The questionnaire used adopted an existing questionnaire with a validity value with item convergent validity was found to be significant ($p < 0{,}001$) and reliability of Cronbach's alpha > 0,81 (Gopal *et al.*, 2026). The questionnaire was structured into three sections: (1) sociodemographic and professional characteristics; (2) organizational support and ergonomic resources; and (3) self reported musculoskeletal symptoms and related work impacts.

Each participant was required to konform their eligibility before proceeding to the main survey. Data confidentiality was maintained by anonymising responses and storing them in a secure digital database accessible only to the research team. To ensure clarity and comprehension, the survey was pretested among five midwives, and minor revisions were made to improve the wording and sequencing of question.

E. Data Analysis Techniques

Descriptive and inferential statistical analyses were conducted using Jamovi. Descriptive statistics summarised the demographic and occupational characteristics of the respondents, including frequencies, percentages, means, and standard deviations. Inferential analyses examined correlations between independent and dependent variables to identify significant associations. The primary analytical methods included Chi-square tests for categorical variables with significance levels were set at $p < 0.05$.

The analytical approach mirrored methodologies used in previous studies examining ergonomic risk factors in healthcare professions (Jacquier-Bret & Gorce, 2023; Mohammed et al., 2024). The analysis aimed not only to identify significant predictors of MSDs but also to highlight systemic gaps in ergonomic support. This dual level analysis aligns with recent trends in occupational health research that advocate for integrated models combining individual and organizational determinants (Antonella et al., 2023).

RESULT AND DISCUSSION

A. Result

Prevalence and Impact of Musculoskeletal Disorders (MSDs)

The findings of this study reveal a high prevalence of musculoskeletal disorders (MSDs) among Indonesian midwives, consistent with prior

international research that identifies MSDs as a widespread occupational concern in maternal health professions (Hasheminejad et al., 2023; Okuyucu et al., 2021). Of the total respondents who reported MSDs, 57% indicated that their symptoms had a significant impact on their ability to perform daily work activities. This proportion aligns closely with global trends, where functional limitations due to MSDs have been observed to affect between 50% and 70% of healthcare professionals in similar roles (Mavoungou et al., 2022).

The most commonly affected body regions reported by participants were consistent with international findings, where the lower back, neck, and shoulders are identified as primary anatomical sites of discomfort (Hasheminejad et al., 2023; Okuyucu et al., 2021). While the study did not include biomechanical analysis, the qualitative responses suggest that tasks involving sustained bending, awkward postures during delivery, and patient handling remain critical contributors. These results underscore the cumulative strain inherent in midwifery practice, particularly in resource limited environments lacking adequate ergonomic infrastructure (Saha & Zahiruddin, 2022).

Demographic and Individual Characteristics

Table 1 presents the characteristics of respondents who reported MSDs, providing a demographic and occupational overview. The largest proportion of affected midwives (56.1%) were in the productive age group (31–44 years), contradicting the conventional assumption that MSD risk increases primarily with older age (Aleku et al., 2021). This finding suggests that mid-career professionals those balancing extensive workloads and leadership responsibilities may experience heightened exposure to both physical and psychosocial stressors. The risk in this group may also reflect cumulative exposure from previous years of practice combined with continued high job demands.

Body Mass Index (BMI) also emerged as a significant factor. The highest proportion of respondents experiencing MSDs (36.6%) fell within the Obesity I category (BMI 25.0–29.9), followed by 19.5% who were overweight. This pattern corroborates earlier findings that excess body weight contributes to greater biomechanical load on the spine and lower extremities, thereby increasing the risk of MSDs (Okuyucu et al., 2021). These results highlight the interaction between lifestyle-related factors and occupational demands, further emphasizing the importance of preventive health measures targeting midwives' physical fitness and weight management.

In terms of work experience, the distribution of MSD occurrence was relatively even across tenure categories: 34.1% in early career midwives (<10 years), 32.9% among moderately experienced (10–19 years), and 32.9% among highly experienced midwives (≥20 years). This finding supports the idea that MSD risk is pervasive across all career stages, likely due to the repetitive and physically demanding nature of midwifery tasks that do not significantly change with seniority (Hasheminejad et al., 2023). The data further indicate that 40.5% of respondents engaged in shift work, a pattern associated with disrupted circadian rhythms and increased physical fatigue factors previously shown to exacerbate musculoskeletal strain (Booker et al., 2024).

Beyond high physical workloads and suboptimal ergonomic postures, individual demographic and personal characteristics most notably age, BMI, and years of professional experience serve as significant predictors of musculoskeletal

symptom onset, severity, and distribution (Geto *et al.*, 2025).

Table 1. Characteristics of Respondents Experiencing Musculoskeletal Disorders (MSDs)

Variable	Category	Frequency	Percentage
Age	Early Career (19–30 years)	7	8.5%
	Productive (31–44 years)	46	56.1%
	Increased Risk (≥45 years)	29	35.4%
BMI	Underweight (<18.5)	0	0%
	Normal (18.5–22.9)	23	28.0%
	Overweight (23.0–24.9)	16	19.5%
	Obesity I (25.0–29.9)	30	36.6%
	Obesity II (≥30.0)	13	15.9%
Work Experience	<10 years	28	34.1%
	10–19 years	27	32.9%
	≥20 years	27	32.9%
Shift Work	Yes	34	40.5%
	No	48	57.1%
Marital Status	Married	75	89.3%
	Unmarried	7	8.3%
Number of Children	0	7	8.5%
	1	16	19.5%
	2	43	52.4%
	3	14	17.1%
	>3	2	2.4%

Marital and family status also appeared to influence MSD prevalence. The majority of affected midwives (89.3%) were married, and 52.4% had two children. This trend aligns with evidence suggesting that domestic responsibilities compound occupational stress, particularly in female-dominated professions where household chores and caregiving tasks often add to overall physical burden (Kiss et al., 2024; Mavoungou et al., 2022). The intersection of professional and domestic duties likely results in reduced recovery time and cumulative fatigue, exacerbating vulnerability to MSDs.

The Chi-square test results indicated a significant association between Body Mass Index (BMI) and the occurrence of MSDs ($\chi^2 = 6.42$, $p = 0.04$), as well as between shift work status and MSD prevalence ($\chi^2 = 5.83$, $p = 0.02$). No significant relationships were found for age, marital status, or years of experience ($p > 0.05$).

Organizational, Domestic, and Psychosocial Support Factors

The findings of this study reveal interrelated deficiencies in organizational, domestic, and psychosocial support that collectively influence the prevalence of musculoskeletal disorders (MSDs) among midwives. Organizationally, 83.3% of respondents reported the absence of formal ergonomic guidelines, and 87.8% had never received ergonomics related training. This systemic gap reflects inadequate occupational health policy, consistent with previous studies in Southeast Asia (Okuyucu et al., 2021; Saha & Zahiruddin, 2022). Although 81.1% perceived their equipment as comfortable, this may indicate adaptation rather than true ergonomic sufficiency (Kiss et al., 2024). Limited training and oversight contribute to unsafe work practices that perpetuate physical strain.

Domestic responsibilities further intensify the risk of MSDs. Two-thirds (66.7%) of respondents lacked household

assistance, illustrating the double burden faced by midwives balancing professional and family roles (Table 2). This aligns with evidence that dual workload and limited recovery time exacerbate fatigue and musculoskeletal strain (Mavoungou et al., 2022). Psychosocial pressures such as role conflict, high workload, and low job satisfaction mediate these relationships, amplifying vulnerability to chronic pain and injury (Dartey et al., 2024; Okuyucu et al., 2021).

Table 2. Organizational, Domestic, and Psychosocial Support Systems of Respondents

Variable	Category	Percentage
Ergonomic	Available	16.7%
Guidelines	Not Available	83.3%
Ergonomics	Received	12.2%
Training	Not Received	87.8%
Comfortable	Yes	81.1%
Equipment	No	18.9%
Household	Yes	33.3%
Assistance	No	66.7%

Chi-square analysis indicated significant associations between the presence of ergonomic guidelines and MSD prevalence ($\chi^2 = 7.25$, $p = 0.01$), ergonomic training and MSD occurrence ($\chi^2 = 6.91$, $p = 0.02$), household assistance and MSD frequency ($\chi^2 = 5.84$, $p = 0.03$), and job stress level and MSD frequency ($\chi^2 = 8.04$, $p = 0.01$). These results confirm that both workplace and domestic contexts, combined with psychosocial conditions, jointly shape ergonomic risks

B. Discussion

The findings of this study confirm that musculoskeletal disorders (MSDs) are highly prevalent among Indonesian midwives, reflecting global and regional patterns observed in comparable healthcare settings (Heuvel et al., 2023; Joho & Abdallah, 2024). As shown in Table 1, more than half of respondents reported that MSDs interfered with their ability to perform professional tasks, particularly those involving repetitive bending, lifting, and awkward postures. This pattern corresponds with international evidence identifying the lower back, shoulders, and neck as the most common anatomical sites of musculoskeletal discomfort among midwives and nurses (Hasheminejad et al., 2023; Okuyucu et al., 2021). The occupational nature of midwifery requiring sustained physical exertion, manual patient handling, and prolonged static positions inevitably predisposes practitioners to these disorders.

A salient aspect of the findings is that MSD prevalence peaked among midwives aged 31 – 44 years. This result diverges from the conventional assumption that older workers are more vulnerable to musculoskeletal deterioration (Aleku et al., 2021). Instead, it suggests that mid-career professionals are disproportionately burdened by high workloads, frequent night shifts, and managerial responsibilities, all of which compound physical strain. The high proportion of affected midwives with elevated BMI levels further reinforces the synergistic effect between occupational and physiological factors, confirming prior research linking obesity with increased biomechanical load on spinal and lower limb structures (Okuyucu et al., 2021). These findings point to the complex interaction between lifestyle, age, and occupational exposure that determines MSD risk across a career trajectory.

Biomechanically, advancing age correlates with progressive physiological degeneration of connective tissues and reduced muscular strength, an elevated BMI subjects weight bearing joints and axial structures to continuous mechanical overload and systemic metabolic stress, and cumulative years of professional experience reflect prolonged exposure to

repetitive micro traumas (Kaboré and Schepens, 2023; Zeng *et al.*, 2026).

The study highlights critical organizational shortcomings, particularly the absence of ergonomic guidelines and training in most healthcare facilities (Table 2). These findings align with previous research documenting systemic deficits in ergonomic support in Southeast Asian healthcare environments (Heuvel et al., 2023; Joho & Abdallah, 2024). Specifically, 83.3% of respondents reported no available ergonomic guidelines, and 87.8% had never received ergonomics training. Such deficiencies perpetuate a workplace culture in which unsafe practices such as manual repositioning of patients and sustained bending become routine. Similar findings in other LMIC contexts reveal that without institutional reinforcement of safety practices, even well-trained professionals struggle to maintain proper posture and body mechanics under workload pressure (Saha & Zahiruddin, 2022).

Although a majority of midwives in this study perceived their current equipment as comfortable, this subjective assessment must be interpreted cautiously. The literature indicates that healthcare workers often normalise discomfort, perceiving it as inherent to their professional role (Kiss et al., 2024). Inadequate awareness of ergonomic standards can lead to false perceptions of safety, masking underlying biomechanical risks. Previous research in hospital settings has demonstrated that the mere availability of equipment does not ensure ergonomic safety; rather, the design, adjustability, and proper use of tools are the critical determinants of injury prevention (Heuvel et al., 2023). Consequently, the absence of ergonomics focused supervision or continuous professional education limits the sustainability of safe work behaviours.

A distinctive dimension of this study concerns the integration of domestic and psychosocial factors into the analysis of MSD risk. The majority of respondents (66.7%) reported lacking household assistance, reflecting the dual workload faced by many female healthcare professionals. This dual role combining professional responsibilities with domestic caregiving intensifies cumulative physical and psychological strain (Kiss et al., 2024; Mavoungou et al., 2022). Prior studies confirm that prolonged exposure to such compounded stress leads to higher rates of musculoskeletal symptoms, particularly among women in middle adulthood who simultaneously shoulder familial obligations and professional expectations. In these cases, domestic labour becomes an unmeasured but significant ergonomic exposure contributing to chronic fatigue and reduced musculoskeletal recovery.

Psychosocial dynamics further exacerbate the risk profile. High workload, shift work, and emotional demands inherent in maternal care services interact to heighten susceptibility to MSDs. Okuyucu et al. (2021) and Dartey et al. (2024), reported that psychosocial stressors not only amplify the perception of pain but also accelerate the onset of musculoskeletal discomfort by increasing muscle tension and reducing recovery time. Within the Indonesian context, cultural expectations of midwives to maintain endurance and composure despite physical discomfort reinforce this problem, discouraging open communication about pain and limiting early intervention opportunities (Garti et al., 2023). Thus, MSDs among midwives should be conceptualised not merely as physical injuries but as biopsychosocial outcomes influenced by intersecting domains of labour, culture, and gender.

Globally, integrated ergonomic and organizational interventions have shown measurable success in reducing MSD risks among healthcare professionals. Evidence from controlled trials demonstrates that

ergonomic assessments, provision of adjustable lifting equipment, and targeted training programs significantly reduce injury rates and enhance worker satisfaction (Heuvel et al., 2023; Joho & Abdallah, 2024).

Moreover, interventions that combine physical redesign with psychosocial support such as stress management, mindfulness-based coping training, and peer mentoring have proven especially effective in sustaining behavioural change (Albendín-García et al., 2021). These holistic strategies recognise that MSD prevention requires concurrent attention to workload, posture, and mental well-being.

However, translating such models into resource constrained environments like Indonesia requires contextual adaptation. Structural and financial limitations often preclude high-cost interventions, such as advanced mechanical lifts or extensive retraining programs. Instead, practical, low-cost ergonomic solutions such as locally produced adjustable stools, modified work surfaces, and task rotation offer feasible alternatives (Saha & Zahiruddin, 2022). Peer led education models, in which experienced midwives train their colleagues on safe techniques, have also been shown to enhance knowledge retention and foster collective responsibility for workplace safety (Kiss et al., 2024). The adoption of culturally tailored, participatory approaches is therefore essential for ensuring both sustainability and adherence.

Policy level support is another critical factor determining success. In contrast to many high-income countries where occupational safety regulations mandate ergonomic training and workplace assessments, Indonesia lacks comprehensive national standards addressing MSD prevention in healthcare settings (Marsden et al., 2022; Rickard et al., 2022). The absence of regulatory enforcement results in variable institutional commitment, with many facilities prioritising service throughput over staff well-being. Developing concise, user-friendly guidelines specifically tailored to midwives' tasks supported by government health authorities could bridge this policy gap. Such guidelines should emphasize practical ergonomics principles applicable within space-limited, high-demand environments typical of Indonesian maternity care facilities.

The implications of these findings for healthcare management and workforce sustainability are substantial. MSDs contribute not only to personal suffering but also to reduced work efficiency, absenteeism, and increased staff turnover (Heuvel et al., 2023). In Indonesia, where midwives constitute a cornerstone of primary healthcare delivery, ensuring their physical well-being is directly linked to maternal and neonatal health outcomes. Effective ergonomic interventions, combined with workload regulation and psychosocial support, can therefore yield system wide benefits.

Ergonomic training and workplace redesign are also instrumental in improving job satisfaction, which has been identified as a key determinant of retention among healthcare professionals (Kiss et al., 2024). By mitigating physical strain and enhancing comfort, organisations can reduce burnout and foster a more resilient workforce. Additionally, visible management commitment to staff welfare signals institutional respect and recognition, further strengthening motivation and morale. The evidence suggests that integrating ergonomic safety into performance and quality indicators can institutionalise such commitments, embedding worker health within broader healthcare governance frameworks.

From a gendered perspective, the study underscores the need to address the

intersection between occupational and domestic responsibilities. Providing flexible scheduling, childcare support, and access to household assistance can alleviate dual role strain and improve both physical and psychological outcomes (Mavoungou et al., 2022). Healthcare administrators should therefore view MSD prevention not only as an occupational necessity but as part of a comprehensive gender equity agenda within workforce planning.

Synthesising these insights, a holistic model for MSD prevention among midwives in Indonesia should integrate three key pillars: ergonomic design, organizational culture, and psychosocial resilience. Ergonomic design encompasses both physical modifications and evidence-based training to optimise posture and movement. Organizational culture involves management led commitment to safety, the establishment of formal ergonomic policies, and inclusion of ergonomics in professional development curricula. Finally, psychosocial resilience addresses workload management, stress reduction, and peer support mechanisms that buffer the cumulative effects of physical strain.

These dimensions are interdependent, and their integration represents a pragmatic and context-sensitive response to the complex aetiology of MSDs in midwifery. As demonstrated in previous international research, addressing physical and psychosocial factors in tandem yields the greatest reduction in MSD risk and promotes long-term adherence to preventive practices (Heuvel et al., 2023; Joho & Abdallah, 2024). Within Indonesia, such an approach could be operationalised through collaboration between healthcare institutions, professional associations, and governmental health bodies to standardise ergonomics education and monitoring. This study thus contributes empirical evidence supporting the design of sustainable, system level interventions to protect midwives from occupational musculoskeletal risks. However, this research is only limited to bivariable analysis, so it is still descriptive research.

CONCLUSION

This study reveals a high prevalence of musculoskeletal disorders (MSDs) among Indonesian midwives, influenced by both individual and organizational factors. Over half of respondents experienced MSDs affecting their work performance, mainly in the lower back, shoulders, and neck. Mid-career midwives (31–44 years) were the most affected, indicating cumulative workload and dual role stress as key contributors. Obesity and extended working hours increased susceptibility, while the lack of ergonomic guidelines, limited training, and insufficient household assistance aggravated fatigue and recovery challenges. These findings demonstrate how workplace ergonomics, psychosocial well-being, and gendered domestic roles collectively shape musculoskeletal health in midwifery. The study contributes to the global understanding of occupational health in low resource contexts, emphasising that ergonomic training, better workplace design, and stronger organizational support can reduce MSDs, enhance job satisfaction, and improve workforce retention, providing a foundation. This study was limited to bivariate analysis, making it a descriptive study. Further research is needed to examine the most dominant factors causing musculoskelatal disorder.

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