Jurnal Kegawatdaruratan Medis Indonesia (JKMI)
Volume 5 Issue 1, February 2026, Pp 97-108
https://ebsina.or.id/journals/index.php/jkmi
EISSN 2502-2717

Move Well, Live Well: A Preventive Epidemiology Approach to Musculoskeletal Health

Umy Yonaevy*[1], Syarifah Syarifah[2], Ratih Prananingrum[1]
[1] Department of Occupational Therapy, Poltekkes Kemenkes Surakarta, Indonesia
[2] Department of Orthotics and Prosthetics, Poltekkes Kemenkes Surakarta, Indonesia

ARTICLE INFO

Article History:
Submitted: 04-11-2025
Revised: 29-12-2025
Accepted: 29-01-2026
Published: 28-02-2026

doi.org/10.58545/jkmi.v5i1.746

Copyright (c) 2026
This is an open-access article under the CC BY-SA license.

ABSTRACT

Background: Musculoskeletal disorders (MSDs) are among the leading causes of disability worldwide and continue to impose a substantial social and economic burden. Population aging, urbanization, and increasingly sedentary lifestyles have contributed to the increasing prevalence of MSDs. However, evidence on large-scale prevention strategies, particularly those applicable across diverse sociocultural contexts and low- and middle-income countries (LMICs), remains limited. **Objective:** This scoping review aimed to examine recent trends in the epidemiological burden of MSDs and identify effective community-based health promotion and prevention strategies reported in the contemporary literature. **Methods:** The scoping review was conducted following the PRISMA-ScR guidelines. Literature published between January 2020 and September 2025 was retrieved from Scopus, PubMed, and Google Scholar. After a systematic screening process, seven studies meeting the predetermined inclusion criteria were selected for descriptive and thematic analysis. **Results:** The reviewed evidence indicates a substantial and sustained increase in the global burden of musculoskeletal disorders (MSDs), reaching an estimated 1.686 billion cases in 2021 and projected to increase to 2.161 billion by 2035. Women of reproductive age and individuals in the productive working-age population (15–39 years) appear to be disproportionately affected. Key contributing factors include prolonged sitting, a sedentary lifestyle, and sustained static postures in educational and occupational settings. Interventions focused on ergonomics education, posture improvement, and physical activity promotion in schools and workplaces have consistently shown positive outcomes, including improved health literacy and healthier movement behaviors. **Conclusion:** The increasing burden of MSDs underscores the need to shift public health efforts from a treatment-oriented approach toward prevention and promotion strategies. The “Move Well, Live Well” framework emphasizes lifelong ergonomics education, workplace health promotion, and evidence-based policymaking. Early and interdisciplinary interventions in schools and workplaces can play a critical role in reducing future disability, increasing productivity, and supporting healthier communities.

Keywords: Musculoskeletal disorders, Preventive epidemiology, Global burden of disease, Health promotion, Occupational ergonomics

Corresponding Author:
Umy Yonaevy
Department of Occupational Therapy Poltekkes Kemenkes Surakarta
Jl. Letjen Sutoyo, Mojosongo, Kec. Jebres, Surakarta, Jawa Tengah 57127, Indonesia
Email: ummyyonaa12@gmail.com

How to cite:
Yonaevy, U., Syarifah, S., & Prananingrum, R. (2026). Move Well, Live Well: A Preventive Epidemiology Approach to Musculoskeletal Health. Jurnal Kegawatdaruratan Medis Indonesia, 5(1), 97-108. https://doi.org/10.58545/jkmi.v5i1.746

Jurnal Kegawatdaruratan Medis Indonesia (JKMI)
Volume 5 Issue 1, February 2026, Pp 97-108
https://ebsina.or.id/journals/index.php/jkmi
EISSN 2502-2717

1. INTRODUCTION

Musculoskeletal disorders (MSDs) have quietly emerged as one of the most pressing yet underappreciated public health challenges of our time. Behind the staggering statistic of 1.71 billion people living with these conditions worldwide lies a complex web of human suffering, individuals unable to work, care for their families, or engage fully in community life (WHO, 2022). The latest Global Burden of Disease Study 2021 reveals not just numbers, but a troubling trajectory that MSD cases climbed to 1.686 billion in 2021, marking a significant escalation from three decades prior (Liu et al., 2025). This is not merely an epidemiological trend; it represents a growing crisis that threatens to overwhelm health systems and economies, particularly in nations least prepared to bear its weight.

The situation carries particular urgency for middle-income countries like Indonesia, where the convergence of demographic transition and rapid lifestyle changes creates a perfect storm. As populations age and sedentary behaviors become entrenched alongside rising obesity rates, the orthopedic disease burden intensifies. However, paradoxically, these conditions remain stubbornly underdiagnosed and undertreated at the community level. The consequences extend far beyond individual pain and mobility limitations. They ripple through households and workplaces, eroding productivity, straining primary care systems, and perpetuating cycles of disability that could have been prevented (Ma et al., 2023; Hasiholan et al., 2024).

What makes this crisis particularly frustrating is not its inevitability, but our collective failure to confront it with the preventive rigor it demands. While the clinical management of MSDs has advanced considerably, the science of preventing these conditions at the population level remains surprisingly underdeveloped. Recent efforts to map the relationship between disease burden and research investment, such as Nguyen et al.'s (2024) ecological analysis, have exposed uncomfortable truths: musculoskeletal health receives disproportionately low funding relative to its societal impact, and community-based prevention strategies remain scattered and poorly coordinated. Similarly, although scholars like Draper-Rodi et al. (2024) have championed primary and secondary prevention approaches, their work reveals a persistent blind spot: most epidemiological studies fixate on low back pain and osteoarthritis, leaving the broader spectrum of orthopedic disorders in communities largely unmapped.

This fragmented understanding matters because effective prevention requires more than identifying risk factors in isolation. It demands a comprehensive picture of how orthopedic disorders distribute across populations, which groups bear the heaviest burden, and what sociocultural contexts shape vulnerability. Without this epidemiological intelligence, prevention efforts remain reactive rather than strategic, treating symptoms rather than addressing root causes embedded in work environments, educational systems, and community structures.

Our study addresses this gap by systematically mapping the epidemiological burden of orthopedic disorders in community populations through a preventive epidemiology lens. Rather than approaching MSDs solely as clinical entities requiring treatment, we examine them as population health phenomena shaped by lifelong exposures and modifiable social determinants. Specifically, we seek to quantify burden metrics across diverse orthopedic conditions, identify the sociodemographic and behavioral patterns that predict risk, and critically evaluate which promotive and preventive interventions show genuine promise in real-world settings.

The theoretical foundation for this work draws from two complementary frameworks. Rose's (1985) Preventive Epidemiology Model reminds us that population-level disease patterns emerge not just from high-risk individuals but from the distribution of risk factors across entire populations. This shifts our focus from individual rehabilitation to upstream interventions that reshape environments and behaviors at scale. Complementing this, the Lifespan Health Development Framework (Halfon & Hochstein, 2002) illuminates how early exposures in schools, workplaces, and communities accumulate over time to shape orthopedic health trajectories. Together, these perspectives challenge us to think beyond episodic care toward integrated strategies that begin in childhood and extend through working life into older age.

From a practical standpoint, this review aims to equip health promotion practitioners and policymakers with actionable evidence for designing community-level interventions. Whether through physical activity campaigns that resonate with local cultures, ergonomic modifications tailored to informal sector workplaces, or early screening protocols for aging populations, the goal is to translate epidemiological insights into tangible prevention programs. For middle-income countries navigating rapid demographic and epidemiological

Jurnal Kegawatdaruratan Medis Indonesia (JKMI)
Volume 5 Issue 1, February 2026, Pp 97-108
https://ebsina.or.id/journals/index.php/jkmi
EISSN 2502-2717

transitions, such evidence is not merely academic. It is essential for crafting national strategies that can stem the tide of musculoskeletal disability before health systems buckle under its weight.

By centering on population-level metrics rather than solely on clinical outcomes, this study offers a distinct perspective on the orthopedic public health literature. It asks not just how we treat musculoskeletal disorders more effectively, but how we prevent them more intelligently, building communities where moving well becomes the foundation for living well.

2. METHODS

This study is a qualitative literature review that aims to map the latest scientific evidence on preventive epidemiological approaches to musculoskeletal health in a public health context. The study design follows the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) guidelines developed by Tricco et al. (2018) and the methodological guidelines from the Joanna Briggs Institute (JBI) (Peters et al., 2020). This study was conducted from August to October 2025, with stages including: (1) identification of research questions, (2) literature search, (3) screening and selection of articles, (4) data extraction, and (5) analysis and presentation of results. The research questions were formulated using the PCC (Population, Concept, Context) framework: Population: individuals at risk or suffering from musculoskeletal disorders; Concept: preventive epidemiological approaches and strategies to prevent orthopedic diseases; Context: public health services and communities in various countries.

An online search for articles was conducted through the Scopus, PubMed, and Google Scholar databases, using a combination of keywords and Boolean operators: ("musculoskeletal health" OR "orthopedic disorders") AND ("preventive epidemiology" OR "public health" OR "health promotion"). The publication date range was set from January 2020 to September 2025 to obtain relevant and up-to-date results. Identified articles were exported and managed using Microsoft Excel for recording and selection.

The literature selection process was conducted in two stages. The first stage involved screening titles and abstracts to assess their relevance to the research topic. The second stage involved a full-text review to evaluate compliance with the inclusion and exclusion criteria. Two independent reviewers conducted the selection process to minimize bias, and

disagreements were resolved through discussion until consensus was reached (Ouzzani et al., 2016). Inclusion criteria included: (1) primary research articles, (2) discussing the burden of musculoskeletal disease or promotive-preventive strategies, (3) published in reputable scientific journals, (4) in English or Indonesian, and (5) available in full text. Exclusion criteria included books, editorials, opinion articles, or articles not relevant to the community context. Data extracted from each article included the author's name, year of publication, country, research objective, study design, population, main variables, and outcomes and recommendations related to musculoskeletal disorder prevention. Analysis was conducted descriptively and thematically to identify patterns of findings, trends in research topics, and the dominant forms of preventive interventions reported.

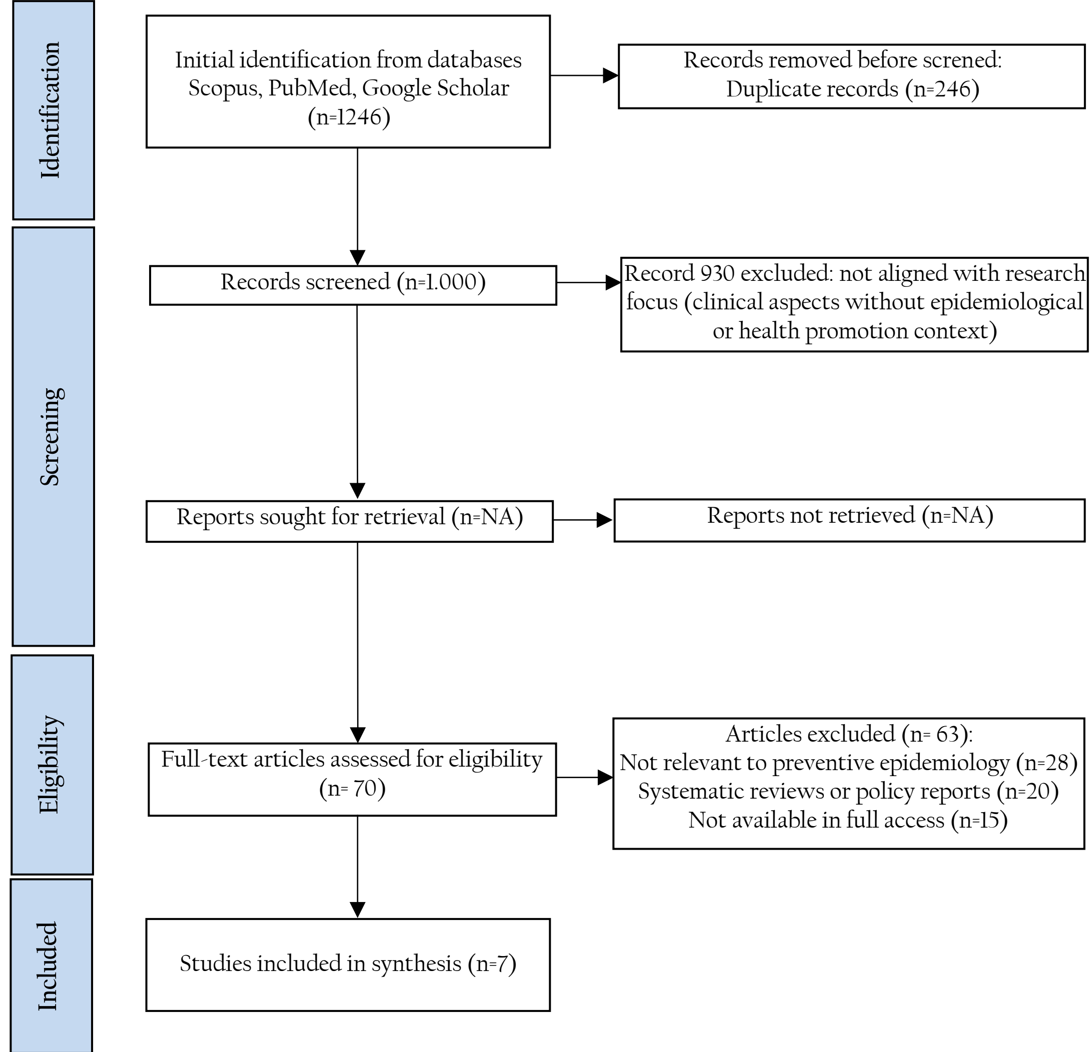

Figure 1. PRISMA Flow chart

3. RESULTS

The literature identification and selection process was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) approach. A literature search of the Scopus, PubMed, and Google Scholar databases using a combination of the keywords "musculoskeletal health," "orthopedic disorders," "preventive epidemiology," and "public health" yielded 1,246 scientific articles. After removing duplicates, 1,000 articles remained, which were screened based on title and abstract.

During the screening phase, 930 articles were eliminated because they did not align with the research focus (e.g., discussing clinical aspects without an epidemiological or health promotion context). A total of 70 articles were selected for full-text review to assess their suitability for inclusion. At the eligibility stage, 63 articles were excluded because they did not meet the criteria: the topic was not relevant to preventive epidemiology (n=28), were systematic reviews or policy reports (n=20), or were not available in full access (n=15). Finally, 7 articles met all inclusion criteria and were analyzed thematically.

Table 2. Characteristics of Included Studies (n=7)

No.	Author (Year)	Study Design	Population	Key Findings	Recommendations
1	Liu, M. (2025)	Secondary analysis of GBD 2021 data (1990–2021)	General population	MSD cases increased 25% since 1990; low back pain and osteoarthritis dominate global DALYs; projected to reach 2.161 billion by 2035	Community-based promotive and early detection interventions needed
2	Du, H. et al. (2025)	Descriptive study using GBD (1990–2021)	Women of reproductive age (15-49 years)	Osteoarthritis and low back pain increased significantly in lower-middle-income countries; 63% increase over three decades	Integration of posture education and physical activity in reproductive health programs
3	Nguyen, A.T. et al. (2024)	Ecological study; correlation analysis of public data	National-level data	Negative correlation between research funding and disease burden in low-middle-income countries (LMICs)	Research funding allocation policy based on disease burden is needed
4	Greggi, C. et al. (2024)	Systematic review of 87 observational studies	Workers across sectors	Working posture, static duration, and repetitive loads are main risk factors for WMSDs	Workplace-based ergonomics and prevention education needs expansion
5	Bussières, A. et al. (2025)	Cross-national survey study	Indigenous adults	Prevalence of chronic pain twofold higher in indigenous groups compared to general population	Promotion of self-care and access to culturally-based services needed
6	Calvo, S. et al. (2025)	Quasi-experimental intervention (3 months)	School communities (students & teachers)	Improved sitting posture, ergonomic awareness, and physical activity of students	MSK promotion programs effective when integrated into school curriculum
7	Ma, X. et al. (2023)	GBD 2019 Analysis (1990–2021)	Adolescents and young adults (15–39 years)	MSD burden increasing among young workers due to sedentary lifestyles	Prevention based on physical activity and ergonomics starting from middle school age

Based on a review of seven scientific articles that met the inclusion criteria, it was found that musculoskeletal disorders (MSDs) remained the largest contributor to the global disability burden over the past two decades. The analysis identified five main themes: (1) increasing global burden, (2) gender and productive age dimensions, (3) lifestyle risk factors related to work and inactivity, (4) social inequalities and access to services, and (5) effectiveness of promotive interventions in schools and communities.

4. DISCUSSION

The review results indicate that musculoskeletal diseases (MSDs) are a leading cause of global disability, with a significant absolute upward trend (Liu, 2025; Ma, 2023). The increase in the number of cases without a corresponding increase in age-standardized rates (ASR) suggests that population growth and aging are the primary factors, rather than increased individual risk. This phenomenon aligns with the theory of preventive epidemiology (Rose, 2008), which emphasizes that most chronic diseases originate from the distribution of risk factors in the general population, not just high-risk groups. Therefore, strategies to address MSDs should not focus solely on rehabilitation services but also on population-based promotive and preventive approaches through enhanced monitoring, physical activity education, and workplace ergonomics campaigns.

A study by Du et al. (2025) showed that women of reproductive age (15-49 years) experienced a 63% increase in the burden of MSDs over the past three decades. This condition is caused by a combination of biological factors (hormonal changes), social factors (dual roles in the household and community), and economic factors (limited access to preventive services). From the perspective of the Health Promotion Model (Pender, 2011), women are a key group in health development because of their role as agents of change within the family. Therefore, preventive interventions should focus on household ergonomics education, simple stretching exercises, and community-based physical activity promotion for women, such as PKK activities or the Posyandu program for Productive Women.

A study by Greggi et al. (2024) strengthens the evidence that workers with static and repetitive postures are at high risk of developing work-related musculoskeletal disorders (WMSDs). This phenomenon is found not only in the industrial sector but also in healthcare and education. Furthermore, increased exposure to digital devices further

increases the risk of neck and back musculoskeletal disorders. In the context of Occupational Health Epidemiology theory, MSDs are classified as occupational diseases that can be prevented through workplace modifications, workload management, and regular stretching exercises. Therefore, implementing Workplace Health Promotion (WHP) policies is highly relevant for institutions and companies in Indonesia.

A study by Bussieres et al. (2025) showed that indigenous communities have twice the prevalence of chronic pain compared to the general population due to limited access to services and socio-economic determinants. In Indonesia, a similar phenomenon can be found in remote areas or 3T (border, outermost, and disadvantaged) areas, where access to rehabilitation services and health education remains limited. The recommended approach is a community-based rehabilitation (CBR) model with local cultural adaptations. This strategy aligns with the WHO Framework on Community-Based Rehabilitation (2019), which emphasizes empowering communities, families, and local workers to prevent and manage musculoskeletal disorders (MSDs) at the community level.

Findings from Calvo et al. (2025) demonstrated the successful implementation of a musculoskeletal health promotion program in schools based on service-based learning. This program increased posture awareness, active behavior, and teacher and student engagement. From the perspective of the Ecological Model of Health Behavior (Bronfenbrenner, 1992), schools are strategic microenvironments in shaping long-term healthy behaviors. The implementation of a similar program in Indonesia can be adapted by integrating School Health Unit (UKS) and Adolescent Posyandu activities, with support from cross-professional collaboration among nurses, physiotherapists, and occupational therapists. This program can also be developed into vocational curricula for health workers.

Nguyen et al. (2024) highlighted the disparity between the burden of musculoskeletal diseases and the allocation of research funding. These diseases are often considered "non-fatal" but have a significant impact on productivity and economic costs due to lost workdays. In the context of national policy, this highlights the need to redirect research funding based on disease burden and integrate MSD data into national surveillance systems such as Riskesdas and the Ministry of Health's Non-Communicable Disease Information

Volume 5 Issue 1, February 2026, Pp 97-108
https://ebsina.or.id/journals/index.php/jkmi
EISSN 2502-2717

System. Effective health policies need to combine three main approaches: promoting active lifestyles and ergonomics through public campaigns, early detection and screening for MSD risk in primary care facilities, and epidemiological monitoring based on national and digital data. When adapted to the national context, the findings of this review are relevant to the Indonesian Health Transformation Policy Direction (Ministry of Health, 2023), which emphasizes promotive and preventive measures as a key pillar of the health system. Implementation can be carried out through PTM Posbindu for early MSD screening in productive age groups, Posyandu for the elderly to prevent decreased mobility, and the Work Ergonomics Program in the informal sector with simple community-based training. With interprofessional synergy (IPE) between occupational therapists, physiotherapists, nurses, and community health workers, the "Move Well, Live Well" strategy can be implemented as a community-based MSD prevention model in Indonesia.

The results of this study support the concept that preventive epidemiology should integrate three levels of prevention: Primary: promotion of physical activity and ergonomics, Secondary: early screening in Posbindu and workplaces, Tertiary: post-injury community rehabilitation. Recommended future research directions include: longitudinal studies to assess the effectiveness of community-based MSD prevention interventions; the development of artificial intelligence (AI)-based risk prediction models; and the Evaluation of disease burden-based funding policies in developing countries.

Based on the analysis, the global burden of musculoskeletal diseases continues to increase and requires a paradigm shift from a curative to a preventive approach. Prevention efforts need to begin at school age and continue in the workplace and community, supported by evidence-based policies and funding commensurate with the disease burden. With the 'Move Well, Live Well' approach, musculoskeletal health promotion can be an integrated strategy to improve quality of life, productivity, and the sustainability of health systems in the Healthy Aging 2045 era.

5. CONCLUSION

This review confirms that musculoskeletal disorders (MSDs) remain a significant global and community health burden, driven by aging, lifestyle, and occupational risks. These findings emphasize that preventive epidemiology, through health education, ergonomic

modifications, and early detection, is essential to reducing the incidence and impact of MSDs. Community-based and interdisciplinary approaches enhance sustainability and relevance across diverse populations. Strengthening health literacy, promoting physical activity, and integrating ergonomics into public health policies are key to improving musculoskeletal well-being. The "Move Well, Live Well" framework thus positions musculoskeletal health as a key foundation for preventive public health, leading to healthier and more productive communities.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to Poltekkes Kemenkes Surakarta for its institutional support and access to academic resources, which facilitated this research.

AUTHOR CONTRIBUTIONS

UY and SS was responsible for conceptualization, data collection, data analysis, and manuscript preparation. UY and SP supervised the research process, contributed to the methodological design and critically revised the manuscript. UY contributed to data interpretation and provided critical review and final approval of the manuscript.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the publication of this article.

DATA AVAILABILITY STATEMENT

The data are not publicly available due to privacy or ethical restrictions.

REFERENCES

Bronfenbrenner, U. (1992). Ecological systems theory. In R. Vasta (Ed.), Six theories of child development: Revised formulations and current issues (pp. 187–249). Jessica Kingsley Publishers. https://www.ncj.nl/wp-content/uploads/media-import/

Bussières, A., et al. (2025). Prevalence and burden of musculoskeletal disorders in indigenous adults: Self-care behaviors and care-seeking. Public Health, 233, 107–115. https://doi.org/10.1016/j.puhe.2024.09.015

Calvo, S., et al. (2025). Benefits of musculoskeletal health promotion in school communities. Frontiers in Public Health, 13, 1507730. https://doi.org/10.3389/fpubh.2025.1507730

Chotisarn, T., & Phuthong, J. (2025). Bibliometric analysis and mapping of

research trends in rehabilitation science. Journal of Rehabilitation Medicine, 57(2), 145–158. https://doi.org/10.2340/jrm.v57i2.3321

Du, H., et al. (2025). Global burden of six musculoskeletal disorders in women of childbearing age. Scientific Reports, 15, 19382. https://doi.org/10.1038/s41598-025-19382-z

Greggi, C., et al. (2024). Work-related musculoskeletal disorders: A systematic review. Journal of Clinical Medicine, 13(13), 3964. https://doi.org/10.3390/jcm13133964

Hadi, N., Natsir, M., & Yusuf, F. (2020). The role of bibliometric analysis in evidence based rehabilitation studies. Malaysian Journal of Health Sciences, 18(1), 45–52. https://doi.org/10.17576/jskm-2020-1801-06

Liu, M. (2025). Analysis of the Global Burden of Disease Study 2021 and projections to 2035 for musculoskeletal disorders. Frontiers in Public Health, 13, 1562701. https://doi.org/10.3389/fpubh.2025.1562701

Marzi, G., Caputo, A., & Dabić, M. (2025). Mapping the intellectual structure of public health research: A bibliometric approach. Health Research Policy and Systems, 23(5), 85–96. https://doi.org/10.1186/s12961-025-01082-9

Ma, X., et al. (2023). Global patterns, trends, and inequalities in early-onset musculoskeletal disorders in individuals aged 15–39 years. Science of the Total Environment, 935, 164720. https://doi.org/10.1016/j.scitotenv.2024.164720

Ni, Z., & Abdullah, S. (2025). Integration of bibliometric methods and systematic reviews in rehabilitation science: An emerging research field. PLOS ONE, 20(6), e0293720. https://doi.org/10.1371/journal.pone.0293720

Nguyen, AT, et al. (2024). Musculoskeletal health: An ecological study assessing the correlation between disease burden and federal funding. The Lancet Regional Health – Americas, 24, 100235. https://doi.org/10.1016/j.lana.2023.100235

Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elyas, A. (2016). Rayyan—a web and mobile application for systematic reviews. Systematic

Reviews, 5(1), 210. https://doi.org /10.1186/s13643-016-0384-4

Pender, NJ (2011). Health Promotion Model: A Manual. University of Michigan, College of Nursing. Peters, MD, Godfrey, CM, McInerney, P., Munn, Z., Tricco, AC, & Khalil, H. (2020). Chapter 11: Scoping Review. JBI Manual for Evidence Synthesis. https://doi.org/10.46658/JBIMES-20-12

Rose, G. (2008). Rose's Preventive Medical Strategies. Oxford University Press.

Tricco, A.C., Lillie, E., Zarin, W., O'Brien, K.K., Colquhoun, H., Levac, D., ... & Weeks, L. (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Annals of Internal Medicine, 169(7), 467–473. https://doi.org/10.7326/M18-0850

Wang, J., & Yi, C. (2025). Bibliometric visualization of rehabilitation and orthopedic studies using PRISMA-guided mapping. BMC Musculoskeletal Disorders, 26(4), 341–352. https://doi.org/10.1186 /s12891-025-07102-3

World Health Organization. (2019). Community-based rehabilitation: CBR guidelines. WHO Press. https://www.who.int/publications/i/item/community-based-rehabilitation-cbr-guidelines