

REVIEW ARTICLE

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REPRODUCTIVE AGING AND MENOPAUSAL TRANSITION IN MALAYSIA: PUBLIC HEALTH AND POLICY STRATEGIES FOR ENHANCING WOMEN'S QUALITY OF LIFEThirumurugan Nyanasegram¹, Khalid Mokti^{1*}**Abstract**

Reproductive aging and the menopausal transition represent significant public health challenges that affect millions of women globally and in Malaysia. By 2030, more than 1.2 billion women worldwide will be menopausal, yet healthcare systems remain insufficiently prepared to address the health, social, and economic implications. This narrative review synthesizes recent evidence (2020-2025) on the epidemiology, challenges, and strategies for improving women's quality of life during menopause, with a focus on Malaysia. Key findings show that the average age of menopause varies globally, ranging from the 47 years in South Asia to 51 years in high-income countries, with early menopause increasingly reported in low- and middle-income regions. Health consequences include osteoporosis, cardiovascular disease, metabolic syndrome, and mental health disorders, compounded by social stigma and inadequate workplace and healthcare support. Public health challenges in Malaysia include limited awareness, lack of provider training, and underfunded menopausal services. Strategies to address these issues involve education campaigns, integration of menopause into primary healthcare, workplace accommodations, lifestyle and preventive interventions, and digital health solutions such as mobile applications and telemedicine. International examples, including UK Menopause Taskforce and WHO's Health Aging framework, provide valuable lessons for Malaysia. However, digital health interventions face challenges related to access, affordability, and data privacy. This review emphasizes the need for culturally sensitive, evidence-based, and policy-driven approaches to strengthen menopausal health services in Malaysia. Future research should evaluate digital health tools, cross-cultural experiences, and long-term health outcomes to guide policy and practice.

Keywords: Menopause, reproductive aging, women's health, public health policy, digital health.

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Received: 05/09/2025

Accepted: 21/12/2025

Published (Online): 22/12/2025

INTRODUCTION

Menopause marks the permanent cessation of menstruation for 12 consecutive months and typically occurs between 45 and 55 years of age (Bharti & Choudhary, 2021). It represents a major biological milestone in women's lives, accompanied by hormonal decline, particularly reduced estrogen, which contributes to vasomotor symptoms, osteoporosis, cardiovascular disease, and psychological changes. Beyond its clinical implications, menopause has substantial social, economic, and public health consequences (Kalita et al., 2024; Srivastava & Sreelatha, 2024). By 2030, an estimated 1.2 billion women worldwide will be menopausal, spending nearly one-third of their lives in the postmenopausal stage (Namazi et al., 2019).

Despite its importance, menopausal health remains underprioritized in health systems. In Malaysia, demographic shifts toward population aging mean that women will increasingly live many years beyond menopause, heightening the burden of age-related diseases and healthcare needs (Abdullah et al., 2024). However, current services for menopausal care remain fragmented, with limited provider training, lack of structured policies, and persistent stigma surrounding discussions of reproductive aging. These gaps result in untreated symptoms, reduced quality of life, and loss of productivity, particularly for working women.

From a policy perspective, reproductive aging intersects national goals on healthy aging, women's health, and non-communicable disease (NCD) prevention. Yet, few national frameworks explicitly integrate menopause into public health planning. Internationally, the UK Menopause Taskforce and WHO's Healthy Aging agenda highlight how structured policies and health system integration can address this gap (Hacking & Mander, 2022). For Malaysia, adapting such models to local sociocultural contexts offers an opportunity to advance women's health equity.

This narrative review aims to synthesize recent literature (2020-2025) on the epidemiology, public health challenges, and strategies related to menopause, with a focus on Malaysia. It emphasizes the novelty of integrating both policy analysis and digital health perspectives, highlighting opportunities for strengthening menopausal care through education, primary healthcare integrations, workplace policies, lifestyle interventions, and technology-enabled solutions.

METHODS

A literature search was conducted between January and March 2025 using PubMed, Scopus, and Google Scholar. Additional references were identified through citations tracking relevant articles. The search strategy included the following Medical Subject Headings (MeSH) and keywords: "menopause", "reproductive aging", "women's health", "public health policy", "digital health", and "Malaysia". Boolean operators (AND/OR) were used to combine terms, and filters were applied to restrict publications to the years 2020-2025 to ensure relevance and recency.

Inclusion and Exclusion Criteria

Studies were included if they:

- i. Focused on menopause, reproductive aging, or women's health during the menopausal transition.
- ii. Reported on epidemiology, public health challenges, interventions, policies, or digital health solutions
- iii. Were published in peer-reviewed journals, official reports, or organizational frameworks (e.g., WHO, Ministry of Health Malaysia)
- iv. Were written in English

Exclusion criteria included articles published before 2020, studies limited to clinical case reports without public health relevance, and non-peer-reviewed commentaries without empirical data.

Data Extraction and Synthesis

Key data extracted included epidemiological trends, health risks, social and workplace impacts, intervention strategies, and policy responses. Findings were synthesized thematically into subsections: (i) Epidemiology of Menopausal Transition, (ii) Public Health Challenges, (iii) Strategies to Enhance Women's Quality of Life, (iv) Policy Interventions, (v) Lifestyle and Preventive Approaches, and (vi) Digital Health and Technology.

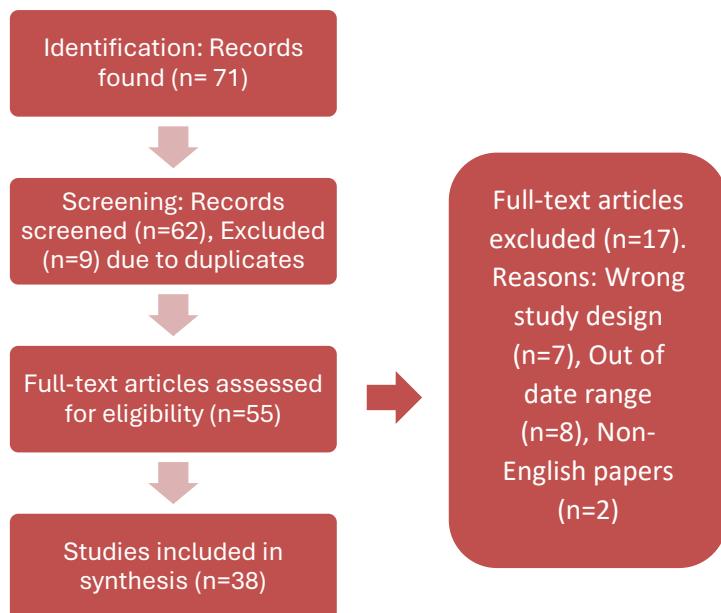


Figure 1: Flow diagram illustrating the selection of literature

RESULTS

Epidemiology of Menopausal Transition

Globally, the average age of natural menopauses ranges between 47 and 51 years, with notable variations across regions (Mishra et al., 2024). In high-income countries, menopause typically occurs at 50-51 years (Mishra et al., 2024), while in South and Southeast Asia the mean age is lower, around 46-48 years (Leone et al., 2023). Studies from India and Zambia report average onset at 47 years, with early menopause (before 45 years) affecting up to 10% of women (Mulenga, 2023; Satapathy et al., 2020; Singh & Kaunert, 2024). Early menopause is increasingly documented in low- and middle-income countries (LMICs), influenced by factors such as smoking, low physical activity, and socioeconomic disadvantages (Djalalinia et al., 2024).

In Malaysia, large-scale national data are limited, but smaller regional studies suggest a mean menopausal age of 50 years, aligning with global averages. With the projected increase in women aged ≥ 50 years, Malaysia faces a growing population of postmenopausal women who will spend up to one-third of their lives in this stage (Osman et al., 2023). This has significant implications for health systems, as menopause is linked to increased risks of osteoporosis, cardiovascular disease, and metabolic syndrome (Siusiuka et al., 2024).

Ethnic and cultural factors also shape experiences of menopause. Evidence suggests that Asian women often report fewer vasomotor symptoms than Western populations but experience higher rates of somatic symptoms, such as joint pain and fatigue (Khoudary, 2020). Immigrant and minority groups face additional challenges related to discrimination, chronic stress, and limited access to culturally appropriate care (Cortes & Marginean, 2022).

Public Health Challenges in Menopausal Transition

Menopause poses a multifaceted public health challenge. Symptom burden affects up to 80% of women, with hot flashes, sleep disturbance, and mood changes impacting quality of life and workplace productivity (Lancet, 2022). In Malaysia, stigma surrounding menopause contributes to silence at both family and community levels, limiting open discussions and healthcare-seeking behavior (Osman et al., 2023).

Healthcare system gaps include lack of provider training, minimal integration of menopause into primary care, and limited access to hormone replacement therapy (HRT) (Hirsch, 2021). Many general practitioners report low confidence in managing menopausal health, reflecting a lack of structured training programs. In rural areas, limited health infrastructure further restricts access (Barber & Charles, 2023).

Economic consequences are also significant. In high-income settings such as the U.S. and Europe, menopause-related productivity losses are estimated in the billions of dollars annually (Ahmed & Hardcastle, 2023). In Malaysia, no such national estimate exists, but anecdotal evidence suggests women face absenteeism, reduced productivity, and in some cases early retirement due to unmanaged symptoms.

Intersectional disparities further compound challenges. Women from lower socioeconomic backgrounds, those with disabilities, or those in informal employment sectors often lack access to healthcare and workplace accommodations (Frank et al., 2024; Zou et al.,

2021). Migrant women may rely on traditional remedies, reflecting cultural norms and healthcare access barriers (Ye et al., 2024).

Strategies For Enhancing Women's Quality of Life

Education and Awareness

Educational campaigns have proven effective in improving menopausal knowledge and reducing stigma. For example, interventions in South Asia showed improved symptom recognition and healthcare-seeking following structured education sessions (Keye et al., 2023). In Malaysia, public campaigns in reproductive health exist, but menopause remains underrepresented compared to maternal and adolescent health programs. Expanding awareness campaigns can empower women to manage symptoms proactively and seek care.

Healthcare Provider Training

Training healthcare providers is crucial. Evidence from the UK and Australia demonstrates that structured menopause training programs for general practitioners improve patient care and confidence in prescribing HRT (Hemachandra et al., 2023). Incorporating menopause into Malaysia's continuing medical education and family medicine curricula would strengthen primary care capacity.

Workplace Policies

Menopausal symptoms disrupt careers, particularly for women in mid-to-senior roles. Internationally, workplace accommodations such as flexible hours, access to cooling facilities, and health consultations have improved retention and productivity (Faubion & Shufelt, 2023). In Malaysia, workplace health policies remain focused on maternity and occupational safety with little attention to menopausal health. Policy integration could reduce absenteeism and support women's participation in the workforce (Hacking & Mander, 2022).

Policy Interventions

Policy frameworks are essential for mainstreaming menopausal care. International examples include the UK Menopause Taskforce (established 2022), which improved treatment access and raised national awareness, and WHO's Healthy Aging framework, which emphasizes integrating aging into primary healthcare systems (Hacking & Mander, 2022).

Malaysia's National Health Policy for Older Persons and Clinical Practice Guideline on Menopause (2022) provide initial foundations. However, implementation remains limited due to resource constraints, lack of funding, and competing health priorities (Abdullah et al., 2024). Strengthening these policies requires clearer financing mechanisms, integration of routine menopausal screening into primary healthcare, and community-based support services (Lee et al., 2025).

Cross-sectoral collaboration with NGOs, employers, and community organizations is also necessary. For example, the Senior Citizens Activity Centers (Pusat Aktiviti Warga Emas, PAWE) could incorporate menopause education and peer-support programs to reduce isolation and stigma among older women.

Lifestyle and Preventive Interventions

Lifestyle modification is a cornerstone of menopausal health. Evidence supports the Mediterranean diet and regular physical activity in reducing vasomotor symptoms and lowering risks of cardiovascular disease and osteoporosis (Vázquez-Lorente et al., 2025). Stress management interventions, including yoga and mindfulness, have also shown benefit (Boakye et al., 2022; Iqbal et al., 2024).

Community-based programs improve adherence by fostering peer support and social accountability. Social prescribing models, where healthcare providers link patients to community exercise or diet programs, have been effective in Europe and could be adapted in Malaysia (Kent-Marwick et al., 2023).

However, barriers remain. Women often struggle with adherence due to caregiving responsibilities, financial constraints, and lack of time. Focused interventions, supported by primary healthcare providers and local communities, are needed to improve long-term adoption.

Digital Health and Technology

Digital health solutions are emerging as promising tools for menopausal care. Mobile applications such as MenoSmile and Menopause Assistant Manager (MAMA) have shown benefits in symptom tracking, self-care education, and emotional support (Kim et al., 2024; Osman et al., 2023). Telemedicine also provides convenient access to consultations, particularly during the COVID-19 pandemic (Shin et al., 2024; Vollrath et al., 2024).

Yet, challenges are significant. Many women, especially in rural Malaysia, face limited internet connectivity, low digital literacy, affordability barriers (S. Z. S. Abdullah, 2022; Maung et al., 2020). Data privacy is another major concern, as most menopause apps lack robust security standards. Without regulation, users risk exposure to misinformation and misuse of sensitive health data (Sillence et al., 2023).

Equitable access requires integrating digital health into existing public healthcare frameworks, providing affordable or subsidized tools, and ensuring cultural and linguistic tailoring for Malaysian users. Regulations must also establish standards for safety, data privacy, and quality assurance (Baltzer & Bonanca, 2023).

DISCUSSION

Main Findings and Significance

Epidemiological evidence shows that while the average age of menopause in Malaysia aligns with global patterns which are around 50 years old of age (J. M. Abdullah et al., 2024), women now spend a larger proportion of their lives post-menopause due to increased life expectancy (Safwan et al., 2024). This demographic shift intensifies risks of osteoporosis, cardiovascular disease, and multimorbidity. Importantly, menopause affects not only health outcomes but also social and economic participation, particularly through workplace disruptions and reduced productivity (Faubion et al., 2024).

In Malaysia, major challenges include inadequate awareness, insufficient provider training, and fragmented integration of menopause into primary healthcare. Current policies,

such as the National Health Policy for Older Persons and the Clinical Practice Guideline on Menopause (2022), offer a foundation but lack robust implementation and financing mechanisms (J. M. Abdullah et al., 2024). This situation mirrors trends in many LMICs, where menopause remains a neglected area of women's health compared to maternal and reproductive health (Wang et al., 2020).

Comparison with Global Best Practices

International examples provide lessons for Malaysia. The UK Menopause Taskforce, established in 2022, has raised national awareness, improved access to hormone replacement therapy, and influenced workplace policies (Hacking & Mander, 2022). Similarly, WHO's Healthy Aging framework emphasizes integrating aging into all levels of healthcare, including reproductive aging. These initiatives underscore the importance of multisectoral collaboration, funding, and sustained advocacy (Cortes & Marginean, 2022).

Malaysia has begun to adopt aging policies but lags in integrating menopause-specific initiatives. Unlike high-income countries, workplace accommodations for menopausal women are largely absent (Riach & Jack, 2021). Moreover, health services in Malaysia remain urban-centered, leaving rural and indigenous populations underserved. Incorporating culturally tailored education, decentralized health services, and affordable treatment options could close this gap (J. M. Abdullah et al., 2024).

Policy and Public Health Implications

Strengthening menopause care in Malaysia requires embedding it into broader health and social systems. Key implications include:

1. Integration into Primary Healthcare: Training general practitioners and family physicians to routinely screen for menopausal symptoms and provide evidence-based treatment, including safe use of HRT, would reduce unmet needs (Zeng et al., 2023).
2. Workplace Policies: Formal policies promoting flexible work arrangements, awareness training for managers, and occupational health services tailored to menopausal women could prevent productivity loss and early retirement (Safwan et al., 2024).
3. Community Engagement: Leveraging community health workers, NGOs, and programs such as Pusat Aktiviti Warga Emas (PAWE) to deliver education and peer support would normalize discussions and reduce stigma (Frank et al., 2024).
4. Digital Health Regulations: Establishing national standards for menopause-related mobile applications and telemedicine services would ensure quality, privacy, and accessibility, while subsidies could enhance uptake in rural areas (Sillence et al., 2023; Vollrath et al., 2024).
5. Financing Mechanisms: Dedicated budget lines within Malaysia's health financing system are necessary to fund menopausal health services, training, and digital health innovations (J. M. Abdullah et al., 2024).

Table 1: Public Health Challenges and Recommendations

Domain	Identified Challenge	Evidence-Based Recommendation	Key References
Primary Healthcare	Lack of provider training; fragmentation of services.	Mandate routine menopause screening in primary care; Train GPs in updated HRT guidelines.	J. M. Abdullah et al., 2024
Workplace	Reduced productivity; early retirement due to symptoms.	Implement flexible work arrangements; Occupational health policies specific to menopause.	Riach & Jack, 2021
Community	Stigma; low health literacy regarding aging.	Leverage community centers (e.g., PAWE) for peer support and education.	(Barber & Charles, 2023)
Financing	Lack of dedicated funding for menopausal services.	Create specific budget lines within national health financing for older women's health.	(J. M. Abdullah et al., 2024)

Digital Health Opportunities and Risks

Digital health solutions are promising but must be critically examined. Evidence suggests that mobile apps can improve symptom tracking and self-care, while telemedicine enhances access to consultations (Baltzer & Bonancina, 2023). However, digital divides persist, especially for women in rural and low-income settings. Without careful planning, digital health may exacerbate inequities rather than reduce them (Yoldemir, 2022). Data privacy and misinformation are additional concerns, as most apps lack robust regulatory oversight (Malik et al., 2024). For Malaysia, integrating digital health into the public healthcare system, ensuring linguistic and cultural adaptation, and providing subsidies for access are crucial steps.

Table 2: Digital Health Solutions: Opportunities versus Risks

Digital Solution	Potential Benefit	Associated Risk/Challenge	Mitigation Strategy	Key References
mHealth Apps	Apps like <i>Health & Her</i> have shown statistically significant reduction in symptoms through self-monitoring and	Quality Control: A 2023 review found many apps lack medical evidence or privacy protection (only 57% had	Establish national standards for app recommendation; promote apps reviewed by medical bodies.	Sillence et al., 2023

	behavioral change.	educational content on bone health).		
Telemedicine	"Impak Sihat" and similar telehealth initiatives can bridge the urban-rural gap and reduce travel costs for women in remote areas.	The Digital Divide: Poor internet coverage in rural Malaysia (<70%) and lower digital literacy among older women (aged >60).	Hybrid models (nurse-assisted tele-consultation at rural clinics); simplified interfaces for elderly users.	(Yoldemir, 2022)
Online Support	Reduces psychological isolation; empowers women to advocate for themselves during doctor visits.	Misinformation: Risk of unregulated advice regarding herbal supplements or unsafe hormone use.	MOH-endorsed digital support groups or moderated forums.	(Hemachandra et al., 2023)

Research Gaps

Several gaps warrant further investigation. First, there is limited national-level epidemiological data on menopause in Malaysia, particularly stratified by ethnicity, socioeconomic status, and geographic region. Second, few studies evaluate the effectiveness of education campaigns, workplace policies, or digital health interventions in LMIC contexts. Third, the long-term safety and cultural acceptability of alternatives to HRT, such as phytoestrogens and cognitive-behavioral therapy, remain underexplored. Fourth, little is known about how intersectional factors such as disability, migration, and gender norms influence menopausal experiences in Malaysia.

Limitations of the review

As a narrative review, this article does not provide the systematic rigor of a meta-analysis. Although recent and relevant studies were prioritized (2020-2025), some earlier foundational studies were excluded, which may limit historical context. Nevertheless, the review synthesized diverse perspectives, integrating epidemiology, public health, policy, and digital health, to provide a comprehensive overview tailored to Malaysia.

Future Directions

Future research should address these gaps through large-scale epidemiological surveys, cross-cultural comparative studies, and evaluations of policy implementation. Digital health interventions should be tested in randomized trials, with particular attention to privacy, accessibility, and cost-effectiveness. Policy evaluations are also needed to measure the impact

of integrating menopause into primary care and workplace structures. Importantly, participatory approaches that include women's voices in policy and program design can ensure culturally relevant and equitable solutions.

CONCLUSION

This review underscores the urgent need to prioritize menopausal health as a public health and policy concern in Malaysia. With increasing life expectancy, women are spending a substantial proportion of their lives in the postmenopausal stage, amplifying risks of chronic diseases, reduced quality of life, and economic consequences. Despite these challenges, menopause remains underrecognized in national health agendas, healthcare training, and workplace policies.

The findings highlight that effective strategies must be multifaceted: integrating menopause into primary healthcare, expanding provider training, supporting workplace accommodations, promoting lifestyle and preventive interventions, and leveraging digital health solutions. Lessons from international models, such as the UK Menopause Taskforce and WHO's Healthy Aging framework, demonstrate the value of structured policy interventions and multisectoral collaboration.

The novelty of this review lies in combining policy analysis with digital health perspectives, offering a forward-looking approach to menopausal care in Malaysia. Future research should focus on evaluating digital interventions, examining cross-cultural experiences, and assessing the long-term outcomes of policy and program implementation. By embedding menopausal health within broader public health strategies, Malaysia can advance women's health equity, promote healthy aging, and strengthen the contribution of women to society across the lifespan.

Acknowledgements

The author gratefully acknowledges the guidance and support of academic mentors, colleagues, and institutional resources that contributed to the development of this review.

Conflicts of Interest

The author declares no conflicts of interest.

Funding

This study received no external funding.

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