Scoping Review on Global Digital Policies and Transformation Strategies for Ageing Societies: Implications for Malaysia

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***Abstract*—The rapid growth of ageing populations presents major social, healthcare, and economic challenges worldwide. Governments are increasingly adopting digital transformation strategies to support ageing societies through artificial intelligence (AI), the Internet of Things (IoT), telehealth, smart environments, and interoperable data systems. However, existing studies often focus on individual technologies, single-country initiatives, or sector-specific programmes, resulting in a fragmented understanding of how digital policies address ageing populations at the global level. This study conducts a scoping review to map digital policies, frameworks, and transformation strategies related to ageing societies and to identify transferable implications for Malaysia. The review follows PRISMA-ScR guidance and applies a Population-Concept-Context (PCC) framework. Searches were conducted across Scopus, Web of Science, IEEE Xplore, ACM Digital Library, PubMed, and institutional repositories for publications and policy documents from 2015 to 2025. After screening 857 records, 63 sources of evidence were included. The findings show that global digital ageing policies cluster around five domains: healthcare digitalisation, social inclusion and active ageing, smart environments and age-friendly cities, governance and data regulation, and economic participation of older adults. Persistent challenges include digital literacy gaps, privacy and ethical concerns, fragmented governance structures, limited interoperability, and unequal digital infrastructure. This review provides a consolidated global overview and highlights policy mechanisms that can inform the development of integrated digital ageing frameworks, particularly for countries preparing for population ageing, such as Malaysia.**

Keywords*—Ageing nation; digital framework; ageing society; digital transformation; scoping review

I. Introduction

The global demographic landscape is undergoing a significant transformation characterized by an unprecedented increase in the ageing population. Projections indicate that by 2030, one in six individuals worldwide will be aged 60 years or over, with the number rising from 1 billion in 2020 to 1.4 billion [1]. By 2050, this demographic is expected to double to 2.1 billion, and the population aged 80 years or older is anticipated to triple, reaching 426 million. This shift presents multifaceted challenges, necessitating comprehensive policies and innovative strategies to ensure the well-being and active participation of older adults in society. The World Health Organization (WHO) has declared 2021-2030 as the United Nations Decade of Healthy Ageing [2].

In response to these demographic changes, digital transformation has emerged as a pivotal approach to address the unique needs of ageing populations. Technologies such as AI, health sensors, and virtual reality applications are being leveraged to enhance healthcare delivery, promote social inclusion, and support independent living among older adults [3].

Over the past decade, numerous countries and regions have introduced digital strategies and policy frameworks aimed at addressing ageing-related challenges. However, the current body of literature remains fragmented and siloed. Much of the research focuses on individual national case studies, specific technologies, or sectoral perspectives, rather than offering a systematic mapping of digital policies and transformation strategies across countries [4]. Consequently, there is limited comparative understanding of how digital transformation is being conceptualized globally in relation to ageing populations, and how different policy approaches address issues such as inclusion, governance, ethics, and sustainability.

Furthermore, critical analyses highlight that many digital ageing policies are characterized by technological optimism, often underestimating the social, ethical, and organizational complexities of ageing and care. This raises concerns about digital exclusion, uneven implementation, and the potential widening of inequalities among older populations if policies are not grounded in integrated, human-centered frameworks [2].

Although several reviews have examined specific technologies or sectoral issues in later life, such as artificial intelligence in elderly healthcare, social housing and ageing in place, and digital health adoption, these works do not comprehensively map national and international digital policies, frameworks, and transformation strategies for ageing societies. Therefore, there remains a need for a scoping review that systematically examines the breadth, characteristics, and conceptual orientations of policy responses across countries and regions.

This scoping review aims to systematically map and synthesize existing digital policies, frameworks, and national digital transformation strategies developed worldwide in response to ageing societies. Specifically, the study seeks to: 1) identify digital policies and frameworks implemented globally to address ageing populations; 2) map the Industry 4.0 and digital components emphasized in these initiatives; 3) compare

policy orientations across regions; and 4) derive implications for Malaysia as it prepares for population ageing. This explicit Malaysia-oriented implication is positioned as an applied extension of the global synthesis rather than as a replacement for the review's international scope.

II. Background

A. Ageing Nation

An ageing nation refers to a demographic shift in which the proportion of older individuals within a country's population surpasses that of younger generations. This phenomenon is primarily driven by three factors: declining fertility rates, increased life expectancy, and advancements in public health systems [5]. According to a study carried out by [6], at least 14 per cent of the population is expected to be aged 65 and above by 2044, with this age group expected to exceed 20 per cent of the population by 2056, giving the country the status of a "super-aged nation".

The shift towards ageing societies is strongly influenced by the demographic legacy of the Baby Boomer generation, generally referring to individuals born during the post-World War II baby boom between 1946 and 1964. Due to its large cohort size, this generation has significantly reshaped population structures as it moves into retirement and older adulthood. This transition has accelerated population ageing in countries such as the United States, Japan, and several European nations, where increased life expectancy and declining fertility have further intensified the ageing process. Similar trends are increasingly evident in developing and upper-middle-income countries, including Malaysia, demonstrating that population ageing is now a global phenomenon with significant implications for healthcare systems, labour markets, social protection, and digital transformation policy [7].

This demographic shift presents multifaceted challenges and opportunities for nations, particularly in areas such as healthcare, economic sustainability, and social inclusion. Ageing societies often face increased healthcare costs, workforce shortages, and a higher dependency ratio, necessitating comprehensive strategies to address these challenges [6]. Concurrently, this transition also presents opportunities for leveraging the potential of older adults in contributing to the economy and society through active ageing policies and digital inclusivity.

B. Digital Policy and Frameworks Around the World

In response to these pressures, digital transformation has been positioned globally as a strategic enabler for supporting ageing societies. Digital health technologies, artificial intelligence (AI), data-driven decision-making, and smart care systems are increasingly promoted as tools to enhance care efficiency, support ageing in place, and improve coordination across service sectors [2]. Digital transformation offers a strategic pathway to address the multifaceted challenges of an ageing population. By leveraging digital technologies, enhancing digital literacy, and fostering collaborative governance, societies can improve the quality of life for older adults and ensure sustainable development [8].

However, scholars caution that digital transformation in ageing contexts is not purely a technical process but a socio-technical transition that reshapes care practices, professional roles, governance arrangements, and citizen-state relationships [9]. Existing academic literature on digital ageing has largely focused on specific domains, particularly eHealth and telemedicine, as mentioned by [9]. Comparative policy analyses, such as studies examining European eHealth strategies, demonstrate that national digital ageing policies differ substantially in their assumptions, governance structures, and emphasis on inclusion and care responsibility [4].

C. Rationale for a Scoping Review

Given the diversity, complexity, and dispersion of digital policies and transformation strategies related to ageing, a scoping review is an appropriate methodological approach. Scoping reviews are particularly suited to mapping broad bodies of evidence, clarifying key concepts, and identifying knowledge gaps in emerging or heterogeneous fields [10].

A preliminary search for existing reviews was conducted using combinations of terms related to "digital ageing", "digital health policy", "eHealth governance", "ageing society", "older adults", "technology adoption", and "scoping review". The search identified reviews focusing on narrower domains, including AI in elderly healthcare, digital health solutions for older adults, social housing, and ageing-in-place services. However, no prior review was found that systematically mapped global digital policies, frameworks, and transformation strategies for ageing societies across multiple continents. This justifies the use of a scoping review to synthesise policy trends, identify dominant conceptual approaches, and highlight gaps for future empirical and policy-oriented research [11],[12].

III. Methodology

This study adopted a scoping review (ScR) approach to systematically map the existing literature on digital policies, frameworks, and transformation strategies related to ageing nations. The review followed the methodological framework of [10] further refined by [13], and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) [14]. The use of a scoping review was deemed appropriate given the objectives of this study: 1) to identify the breadth of available evidence, 2) to map key concepts and policies, and 3) to highlight knowledge gaps for future research [15]. A scoping review protocol was developed a priori to guide the review objectives, eligibility criteria, search strategy, and data charting process. However, the protocol was not registered in an international database. Any deviations from the initial protocol were documented and transparently reported in accordance with PRISMA-ScR recommendations [14].

A. Identifying the Research Question and Objectives

The research questions were formulated using the PCC (Population–Concept–Context) framework recommended for scoping reviews [16]:

- Population: Ageing populations and older adults (aged 60+).

- Concept: Digital transformation strategies, policies, and frameworks leveraging digitalisation, especially Industry 4.0 components (AI, IoT, Big Data, etc.).
- Context: National and international responses to ageing nation challenges.

Guided by the Population–Concept–Context (PCC) framework, this scoping review addresses the following research questions:

- What digital policies and frameworks have been implemented globally to address ageing populations?
- What digital and Industry 4.0 components are emphasised in these initiatives?
- What recurring challenges and gaps are reported in the digital transformation of ageing societies?

B. Information Sources and Search Strategy

A comprehensive search was conducted across Scopus, Web of Science, IEEE Xplore, ACM Digital Library, and PubMed. Complementary searches were also performed through institutional repositories and official websites of international organisations and government agencies, including the World Health Organisation (WHO), United Nations (UN), European Union (EU), OECD, national health ministries, digital government agencies, and ageing-related policy portals. The final search was completed in March 2026. The search strategy combined terms related to ageing populations, digital transformation, digital policy, digital health, Industry 4.0, and policy frameworks. Search limits were applied to English-language sources published between 2015 and 2025 to reflect the Industry 4.0 and digital government era.

- ("digital policy" OR "digital governance" OR "e-government") AND ("ageing population" OR "elderly" OR "senior citizens")
- ("digital transformation strategy" OR "smart ageing" OR "technology adoption") AND ("ageing nation" OR "elderly support")
- ("framework" OR "model" OR "guideline") AND ("digital inclusion" OR "elderly technology adoption")

The search was limited to sources published between 2015 and 2025 to ensure coverage of recent digital transformation, Industry 4.0, and post-pandemic digital health developments.

C. Eligibility Criteria

Studies were included if they:

- Sources published between 2015 and 2025, reflecting the Industry 4.0 and digital government era.
- Peer-reviewed journal articles, reputable news reports, conference proceedings, or official policy reviews.
- Focused on digital transformation, Industry 4.0, or policy frameworks in relation to ageing nations.
- English-language publications.

Excluded studies were those that:

- Focused only on clinical interventions without policy/technology perspectives.
- Were editorials, commentaries, or non-peer-reviewed reports.
- Were duplicate records or outside the scope (e.g., rural housing without digital transformation).
- Non-English publications.

D. Study Selection

All records were exported into Mendeley for reference management and duplicate removal. Title and abstract screening were performed independently by two reviewers using the eligibility criteria. Potentially relevant records were then assessed through full-text screening. Disagreements were resolved through discussion until a consensus was reached. Where a source was a policy document rather than an empirical study, the reviewers assessed whether it explicitly addressed ageing, older adults, digital transformation, digital inclusion, digital health, or related governance mechanisms.

E. Data Charting

A structured data-charting form was developed based on scoping review recommendations and piloted on ten sources before full extraction. Minor refinements were made to improve consistency in recording policy type, digital components, and reported implementation challenges. Data charting was conducted by the first reviewer and checked by the second reviewer for completeness and consistency. Extracted data included:

- Author(s), year, country/region
- Study aim and design
- Population focus
- Policy, framework, or strategy discussed
- Digital/Industry 4.0 components addressed
- Reported challenges

F. Data Analysis and Synthesis

Data were synthesised descriptively and presented in narrative, tabular, and visual forms. First, the included sources were grouped by continent, country, or region, and policy type. Second, digital components were coded into technology categories such as AI, IoT, telehealth, big data, smart homes, digital identity, interoperability, and digital literacy programmes. Third, thematic synthesis was used to identify recurring policy domains. Five themes were finalised through reviewer discussion: healthcare digitalisation and smart health; social inclusion and active ageing; smart environments and age-friendly cities; governance, protection, and data regulation; and work, economics, and productivity. This process enabled both descriptive mapping and comparative interpretation across regions.[14]

IV. RESULTS

A total of 801 records were identified through database searches, and an additional 56 from manual screening of references and relevant policy documents, so the total is 857. After removal of 230 duplicates and 2 for other reasons, 625 unique records were screened by title and abstract. Following the exclusion of 343 unrelated studies, 282 full-text papers were reviewed for eligibility. Following full-text assessment, 219 studies were excluded for reasons such as:

- Reason 1: Focused solely on medical/clinical interventions without a policy or technology framework (n = 134)
- Reason 2: Non-peer-reviewed or grey literature (n = 41)
- Reason 3: Duplicated or incomplete text (n = 42)
- Reason 4: Not available in English (n = 2)

A total of 63 sources of evidence were included in the scoping review as summarized in Table I. Selection process following the PRISMA-ScR guideline is illustrated in Fig. 1. The included documents were predominantly from Asia (38%), followed by Europe (27%), Oceania (7%), North America (4%), Africa (4%), South America (5%), and international or global frameworks (4%), as shown in Fig. 2.

TABLE I. SUMMARY OF SOURCES OF EVIDENCE INCLUDED IN THE SCOPING REVIEW

Continent	Country	Sources
Asia	Japan	Society 5.0 for Super-Aged Society [17] Society 5.0 Japan's National Digital Transformation Vision [18], [19] Japan Revitalization Strategy / Future Investment Strategy (2016–2020) [20] The National Framework for Promotion of Dementia Policies (2019) [21] Community-Based Integrated Care System [22]
	Singapore	Smart Nation 2030 [23] Smart Nation Strategy (2018) [23] Seniors Go Digital Program (2020) [24] Singapore AI Home Healthcare for Ageing Populations [25]
	China	Healthy China initiative 2019 – 2030 [26] eHealth for elderly [26]
	Korea	Digital Inclusion Act 2019 [27] National Responsibility for Dementia System [28] 50+ Site and National Informatization Education Site [29]
	Thailand	Thailand 4.0 [30] National Action Plan for Older Persons Phase 3 (2023-2037) [31] Digital Citizen Course by ETDA [32] Digital Economy and Society Development Plan Digital Thailand [33]
	Qatar	National Health Strategy [34]
	United Arab Emirates	National Policy for Senior Emiratis [35]
	India	Digital India Programme – Digital services for seniors [36]
	Indonesia	Digital Indonesia Vision 2045 [37]
	Malaysia	Malaysia Digital Economy Blueprint [1] National Ageing Blueprint [1]
Europe	EU	Green Paper on Ageing: Fostering Solidarity & Responsibility Between Generations (2021) [38] European Innovation Partnership on Active and Healthy Ageing (EIP on AHA) [39] Active and Assisted Living (AAL) Programme – "Ageing Well in the Digital World" [40] EU Artificial Intelligence Act 2024 [41]
	Finland	eHealth [29] Finland's Kanta Services [42]
	Sweden	Effektiv vård (Efficient Care) 2016 [43] Vision eHealth 2025 [44]
	Italy	National Recovery and Resilience Plan (PNRR) [45]
	France	"Ma Santé 2022" – My Health 2022 (Digital Health Component) [46]
	Germany	Digital Healthcare Act (DVG) (2019) [47] Digital Act (DigiG) (2024) [48]
	Russia	Strategy for the Development of an Information Society (2017–2030)[49]
	Denmark	National eHealth Strategy [50]
	United Kingdom	Ageing Society Grand Challenge & Healthy Ageing ISCF [51] NHS Long Term Plan (Digital Transformation for Ageing Care) [52]
	Spain	Espana Digital 2026 [53]
North America	USA	AI-driven elderly care [54] Federal Health IT Strategic Plan 2020–2025 [55]
	Canada	Digital Literacy Exchange Program (DLEP) [56] Digital Inclusion Principles supporting older adults [57]
South America	Argentina	Digital Inclusion for Older People (Buenos Aires) [58]
	Brazil	Estratégia de Saúde Digital para Brasil 2020–2028 (ESD28) [59]
	Uruguay	Plan Ibirapitá – Digital Inclusion for Older Adults [60]
Ocenia	Australia	Australia's National Digital Health Strategy [61] Digital Health Blueprint & Action Plan 2023–2033 [62] Aged Care Data and Digital Strategy [63] Digital Literacy Program for Older Australians [64]
	New Zealand	Healthy Ageing Strategy 2016 [65] Better Later Life – He Oranga Kaumātua [66] Digital Inclusion Blueprint [67]
Africa	African Union	Digital Transformation Strategy for Africa 2020–2030 [68]
	South Africa	National Digital Health Strategy 2019–2024 [69]
	Rwanda	National Digital Health Strategy (Rwanda) [70]
	Nigeria	Public-private partnerships for older [71]
Global	UN	Global Strategy on Digital Health 2020–2025 [3], [33] UN Decade of Healthy Ageing 2021–2030 [72] Ageing in a Digital World – from Vulnerable to Valuable (2021) [73], [74], [75] mAgeing [76][11]

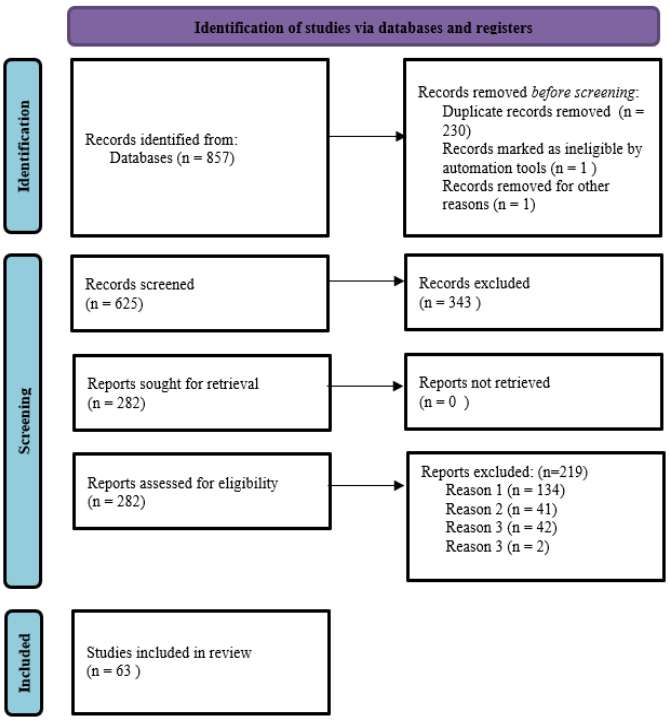

Fig. 1. The PRISMA-ScR process.

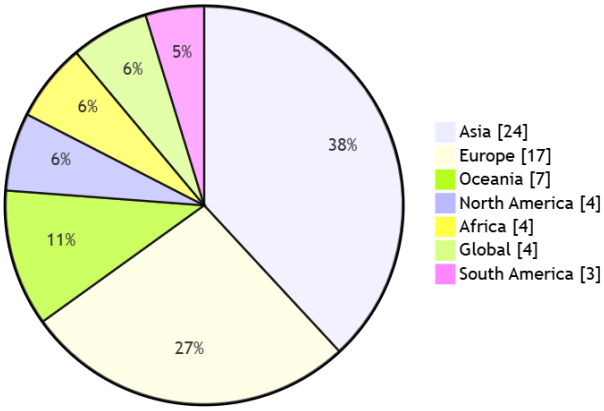

Fig. 2. Distribution of policies by region.

A. Overview of Digital Ageing Policies

The included documents represent a broad spectrum of initiatives addressing ageing populations through digital transformation. These initiatives include national digital policies, international frameworks, AI-driven healthcare initiatives, smart city ageing programmes, long-term care digital strategies, and national action plans.

The reviewed policies span multiple geographical regions, including North America, Europe, Asia, Oceania, and international organisations such as the United Nations (UN), World Health Organisation (WHO), OECD, and the European Union (EU).

Consistent with the objective of a scoping review, the included documents were analysed to identify:

- Policy priorities for ageing societies
- Digital technologies incorporated within policies
- Target domains addressed by national strategies
- Implementation mechanisms and governance approaches
- Gaps and limitations within existing frameworks

B. Geographic Distribution of Policies

The mapping of global policy initiatives indicates that digital ageing strategies are predominantly concentrated in highly developed economies where demographic pressures intersect with advanced technological infrastructures.

Within Europe, policy frameworks such as the European Union Ageing Strategy, Digital Single Market initiatives, Active and Healthy Ageing programmes, and the Ambient Assisted Living (AAL) programme demonstrate long-standing efforts to integrate digital technologies within ageing welfare systems. Similarly, advanced Asian economies have implemented comprehensive digital ageing strategies. Japan's Society 5.0, South Korea's Digital Inclusion Act, Singapore's Smart Nation initiative, and Thailand's Digital Thailand strategy illustrate the region's strong emphasis on utilising emerging technologies to enhance healthcare services, independent living, and social participation for older adults.

In North America, the United States and Canada have institutionalised digital approaches within health and social care systems through initiatives such as the Federal Health IT Strategic Plan, digital literacy programmes, virtual care, and older-adult inclusion initiatives.

In contrast, many developing countries demonstrate fragmented or early-stage digital ageing policies, often limited to pilot projects, donor-supported initiatives, or local programmes without comprehensive national frameworks. This disparity highlights a persistent global digital divide where countries with advanced digital infrastructures and stronger governance capacities are better positioned to implement comprehensive digital ageing strategies.

C. Focus Areas of Digital Ageing Policies

Analysis of the included documents revealed five major thematic clusters that characterize contemporary digital ageing strategies globally. These thematic areas reflect the multidimensional nature of ageing challenges and highlight how governments increasingly rely on digital infrastructures and Industry 4.0 technologies to support health, social participation, mobility, protection, and economic inclusion for older adults.

1) Healthcare digitalisation and smart health: Healthcare digitalisation emerged as the most dominant focus area across global ageing policies. Governments increasingly prioritise telemedicine platforms and remote consultation systems to improve healthcare accessibility for older adults, particularly those with mobility limitations or chronic illnesses.

Artificial intelligence (AI) technologies are frequently integrated into healthcare systems to support predictive analytics, early disease detection, and personalised treatment planning. In addition, IoT-based monitoring systems, including

fall detection sensors and wearable health monitoring devices, enable continuous real-time health monitoring within home environments.

In technologically advanced countries such as Japan, South Korea, and Singapore, robotics and automation are increasingly incorporated into eldercare services, supporting daily living activities and alleviating labour shortages within the caregiving workforce.

2) Social inclusion and active ageing: Another key policy focus involves enhancing social participation and digital inclusion among older adults. Many national strategies include digital literacy programmes, simplified user interfaces designed for senior citizens, and digital community platforms that facilitate civic engagement and social interaction.

Intergenerational digital hubs are increasingly established to support collaborative learning and social activities between younger and older generations. These initiatives highlight the recognition that ageing is not solely a biomedical issue but also a social phenomenon where digital connectivity plays a crucial role in maintaining psychological well-being and community participation.

3) Smart environments and age-friendly cities: Digital ageing policies increasingly integrate smart city technologies to support independent living among older adults. These initiatives include the development of smart homes equipped with automated systems, environmental sensors, adaptive lighting, and remote monitoring technologies.

Universal design principles are widely adopted to ensure accessibility across public infrastructure, housing environments, and transportation systems. Smart mobility solutions such as real-time navigation systems, barrier-free public transport, and autonomous transport technologies are also being explored to enhance mobility and independence among older adults.

Cities including Tokyo, Seoul, and Toronto have implemented integrated digital urban strategies that combine housing digitalisation, smart healthcare services, and community-based support systems.

4) Governance, protection, and data regulation: The fourth thematic domain centres on governance innovations and regulatory frameworks designed to safeguard older adults within digital ecosystems. Many policies articulate robust data protection mechanisms addressing privacy concerns, especially considering older adults' increased vulnerability to cyber risks. Governments are also developing AI ethics guidelines that regulate algorithmic decision-making in healthcare, welfare assessments, and surveillance technologies.

Digital accessibility policies, grounded in rights-based approaches, aim to ensure equitable access to digital services irrespective of age, literacy level, or socioeconomic conditions (ageism). Additionally, several countries have introduced funding mechanisms and innovation accelerators to stimulate research, commercialisation, and ecosystem development around ageing technologies.

5) Work, economics, and productivity: The final thematic focuses on the economic dimensions of ageing, particularly within the EU and OECD contexts where ageing-related labour shortages are becoming increasingly prominent. Policies in this area highlight the importance of upskilling older workers through digital learning platforms, promoting lifelong learning, and supporting flexible employment ecosystems that leverage remote work, gig platforms, and age-inclusive digital industries.

Some countries also explore automation compensation mechanisms and digital tools for labour-market reintegration, recognising that sustained economic participation among older adults is essential for national productivity and long-term economic resilience. These initiatives signal a growing awareness that digital transformation must be closely aligned with workforce longevity and economic sustainability in ageing societies.

D. Challenges and Identified Gaps

Despite the growing number of digital ageing initiatives worldwide, several systemic gaps remain evident. One major challenge involves fragmented governance structures, where responsibilities for ageing and digitalisation are distributed across multiple agencies or ministries, often leading to inconsistent policy implementation and limited cross-sector coordination.

Another recurring issue is the low level of digital literacy among older adults, particularly in rural or lower-income regions, which restricts the effectiveness of digital interventions. Furthermore, digital infrastructures in many rural areas remain underdeveloped, limiting access to telehealth services and digital public platforms.

Ethical concerns related to AI governance and algorithmic decision-making also remain insufficiently addressed within many national policies, particularly regarding issues of data privacy, algorithmic bias, and digital exploitation of vulnerable populations.

Additionally, ageing-related data are frequently fragmented across different government systems, preventing integrated data analytics and evidence-based policymaking. These structural limitations highlight the need for more coordinated and inclusive digital transformation strategies for ageing societies.

V. Discussion

A. Interpretation of Key Findings

The findings of this scoping review reveal that while digital strategies for ageing populations are expanding globally, the landscape remains highly decentralised, unevenly implemented, and shaped by cultural and socioeconomic contexts. The most advanced ageing-nation digital ecosystems, particularly Japan, South Korea, Singapore, and selected member states of the European Union, exhibit strong integration of real-time health monitoring, predictive analytics, and population health surveillance, supported by well-developed digital infrastructures. These countries have also invested heavily in integrated digital public services, smart urban ageing environments, and robust regulatory and funding governance

structures. Such systems reflect long-term institutional commitments to embedding digitalisation within broader national ageing strategies.

Despite these advancements, the review highlights that there is no universal or standardised digital transformation framework applicable across ageing nations. Policy responses remain highly context-dependent, shaped by demographic characteristics, economic capabilities, political structures, and cultural norms. This heterogeneity reinforces earlier arguments that digital ageing policies must be locally adapted rather than globally prescribed.

The predominance of digital health strategy/infrastructure entries is consistent with the global framing that positions digital health as a system-strengthening tool. WHO's global strategy provides a strong rationale for why countries prioritise governance, interoperability and standards. Without these elements, ageing-focused digital services become isolated "apps" rather than system capabilities. This pattern is visible in national strategies that emphasise coherent data-sharing and trustworthy networks (e.g., Denmark) and national platforms enabling citizen and provider access to records (e.g., Finland's Kanta services) [42].

The dataset also shows that digital inclusion & skills policies are frequently programme-based and community-facing, like training, devices, digital identity onboarding, and safer internet use. Singapore's Smart Nation trajectory illustrates how digital inclusion can be formalised as part of national digital transformation, including explicit senior training achievements and a technology portfolio that includes AI and IoT [23].

Australia's Be Connected similarly frames older-adult digital skills and online safety as an ongoing public programme with a multi-year extension, signalling that digital inclusion is treated as a continuing public good rather than a one-off campaign.

B. Cross Country Comparison

A useful cross-country distinction is "infrastructure-first" versus "inclusion-first". Many European countries are "infrastructure-first", which focus on interoperability, platform services, and regulatory governance. Several Asian entries are "transformation-first", which broad digital society programmes (Smart Nation; Society 5.0; Digital India; Indonesia's digital vision) establish a national narrative for technology-enabled development, and ageing-specific measures are nested within that narrative through care models or inclusion programmes.

Oceania is notable for combining both with Australia pairs a digital health blueprint with an aged care data and digital strategy, while also sustaining older-adult digital inclusion programs. New Zealand similarly separates "healthy ageing" and "digital inclusion" into distinct strategies with their own governance pathways, like the Healthy Ageing Strategy, Better Later Life and Digital Inclusion Blueprint, which is analytically valuable because it allows evaluation questions to be matched to the most appropriate policy instrument[77].

In South America, the strongest "evaluation-ready" signal is where programmes are concrete and bounded, like Buenos Aires legal codification of a senior digital inclusion programme and Brazil's digital health strategy with subsequent monitoring. In Africa, the continental African Union (AU) strategy provides enabling pillars like infrastructure, skills, and enabling regulation, which critically has a monitoring, evaluation, and learning (MEL) framework published for implementation learning, which offers a template for countries that lack national evaluation capacity.

C. Best Practices and Transferable Policy Mechanisms

A first transferable mechanism is indicatorisation, turning strategy into measurable commitments. Sweden's indicator-based framework for the follow-up of Vision eHealth 2025 explicitly formalises indicators and is used to structure monitoring outputs, making it a high-quality exemplar for evaluation-driven governance[44]. Similarly, the US Federal Health IT Strategic Plan frames implementation as measurable progress and connects strategy to reporting mechanisms, strengthening accountability for interoperability and access goals[55]. Brazil's ESD28 is relevant because it pairs a strategy document with subsequent monitoring and evaluation reporting, signalling an intention to track progress beyond rhetoric[59].

A second mechanism is evidence-gated adoption. Germany's DiGA fast-track approach institutionalises evaluation by requiring a formal assessment pathway for reimbursable digital health applications and anchoring adoption in a defined evidence concept. This is not directly transferable as a "copy-paste" reimbursement model, but it is transferable as a policy design pattern, with time-boxed evaluation plus conditional adoption to prevent uncontrolled diffusion of unvalidated tools for older adults.

A third mechanism is legal governance for AI and digital services. The EU AI Act operationalises a risk-based approach with obligations that directly map to evaluation and monitoring (dataset quality, traceability, cybersecurity, human oversight). For eldercare contexts where surveillance-like tools, prediction systems, or decision support may be deployed, this provides a policy vocabulary to argue for minimum auditability and safety standards.

A fourth mechanism is community-based inclusion delivery. Singapore's senior digital inclusion programme and Australia's Be Connected show a scalable approach that leverages community partners, formalises curricula and support channels, and treats inclusion as long-term capability-building. Uruguay's Ibirapitá further demonstrates the value of framing inclusion as a rights-based, participatory policy rather than merely "training sessions", which supports sustained engagement.

D. Implications for Malaysia

The findings of this scoping review have important implications for Malaysia as it prepares to become an aged nation. Malaysia has already introduced several ageing-related initiatives, including the National Policy for Older Persons, the National Plan of Action for Older Persons, Pusat Aktiviti Warga Emas (PAWE), Unit Penyayang Warga Emas (UPWE), and welfare-based community programmes. However, these initiatives remain largely social, welfare, and community-development oriented. Therefore, Malaysia's next strategic priority should be to digitally strengthen existing ageing

structures rather than develop a separate digital ageing ecosystem.

PAWE is particularly relevant because it already functions as a community platform for older persons. It can be repositioned as a local digital ageing hub that supports digital literacy, telehealth access, e-government assistance, scam-awareness education, intergenerational digital learning, and community-based social participation. Through this approach, PAWE can become an implementation channel for Malaysia's digital ageing agenda, especially among rural, low-income, and digitally excluded older adults.

At the national level, Malaysia requires a coordinated inter-ministerial governance structure for digital healthy ageing involving welfare, health, digital transformation, local government, housing, and urban planning agencies. Such coordination is consistent with the MADANI aspiration, particularly its emphasis on social protection, inclusiveness, sustainability, compassion, and good governance. In this context, digital transformation for ageing should not be viewed merely as a technological agenda, but as part of a broader national effort to build a caring, equitable, and resilient society.

The integration of AI, Big Data, and IoT into healthcare, social protection, and urban systems should be prioritised to improve predictive planning, service delivery, resource allocation, and early identification of older persons requiring support. Malaysia should also strengthen data governance to ensure privacy, consent, interoperability, cybersecurity, and human oversight in all digital ageing initiatives. This is especially important for technologies such as remote monitoring, assistive robotics, predictive analytics, and AI-enabled health or welfare services.

Collectively, these implications reinforce the strategic importance of the proposed MalaysiaAgeNet framework as a national digital transformation blueprint. By integrating global best practices with existing Malaysian platforms such as PAWE and UPWE, and aligning them with the values of MADANI and the Sustainable Development Goals, MalaysiaAgeNet can provide a practical and context-sensitive pathway for building an inclusive, ethical, and digitally enabled ageing society.

VI. Limitations

This scoping review possesses several methodological limitations that should be acknowledged. First, the scope and depth of available policies varied significantly across countries, with some providing comprehensive national strategies while others offered only high-level or fragmented policy documents. This variability may have influenced the comparative richness of thematic mapping.

Second, the review may not have captured relevant grey literature or unpublished policy documents not indexed in major academic databases, particularly from low and middle-income nations. Third, the rapid pace of technological evolution means that some of the identified policies, especially those published several years ago, may no longer reflect contemporary technological capabilities or policy directions.

Fourth, consistent with PRISMA-ScR guidance, this review did not assess the quality or effectiveness of policy implementation. Therefore, the presence of a policy does not necessarily reflect its success or impact. Finally, the availability of translated government documents was limited, particularly from non-English-speaking countries, which may have resulted in the underrepresentation of certain regions. Despite these limitations, the review provides a robust and timely mapping of global digital ageing strategies and aligns with the intended purpose of scoping reviews: to synthesise broad evidence, identify conceptual patterns, and illuminate gaps in existing knowledge.

VII. Conclusion

This scoping review provides a comprehensive mapping of global digital policies and transformation strategies addressing ageing societies. The findings indicate that digital transformation is increasingly recognised as a key policy mechanism for managing demographic ageing. While several countries have developed advanced digital ecosystems integrating healthcare digitalisation, smart living environments, and regulatory frameworks, many developing countries remain at early stages of policy development.

Persistent challenges include fragmented governance structures, insufficient digital literacy among older populations, limited infrastructure in rural areas, and inadequate attention to ethical and regulatory issues surrounding digital technologies.

For Malaysia, these findings highlight the urgent need to develop an integrated national framework for digital ageing transformation. Establishing coordinated policies and strengthening digital infrastructures will be essential to ensuring sustainable healthcare systems, social inclusion, and economic resilience in the context of an ageing population.

Acknowledgment

This research was funded by the Ministry of Higher Education (MOHE) Malaysia under the Fundamental Research Grant Scheme-Early Career Researcher (FRGS-EC) [Grant Number: FRGS-EC/1/2024/SSI11/UPSI/02/2]. The funder had no role in the study design, data collection, analysis, interpretation of results, or manuscript preparation. The authors would like to acknowledge the support of SIG CultureTech, Universiti Pendidikan Sultan Idris, for its academic support and encouragement in completing this research.

References

[1] N. Azhar and A. Omar, "Aging Workforce in Malaysia: Navigating Challenges and Shaping Policies," Quantum Journal of Social Sciences and Humanities, vol. 6, no. 2, pp. 226–236, Apr. 2025, doi: 10.55197/qjssh.v6i2.615.

[2] World Health Organization, "UN Decade of Healthy Ageing: Plan of Action," 2023.

[3] World Health Organization, "Global Strategy on Digital Health 2020-2025," World Health Organization, 2021.

[4] H. Valokivi, S. Carlo, E. Kvist, and M. Outila, "Digital ageing in Europe: a comparative analysis of Italian, Finnish and Swedish national policies on eHealth," Ageing Soc., vol. 43, no. 4, pp. 835–856, Apr. 2023, doi: 10.1017/S0144686X21000945.

[5] S. Harper, "Economic and social implications of aging societies," Oct. 31, 2014, American Association for the Advancement of Science. doi: 10.1126/science.1254405.

[6] D. Wachs, G. Demarco, and F. Stewart, "Lessons for aging countries: Navigating the challenges of a growing elderly population," World Bank

Blogs. Accessed: May 10, 2025. [Online]. Available: https://blogs.worldbank.org/en/investinpeople/Lessons-for-aging-countries

[7] D. E. Bloom and D. L. Luca, "The Global Demography of Aging: Facts, Explanations, Future," 2016.

[8] S. García-Aguña, D. Fernández-Roses, L. P. Gallardo-Peralta, and E. Sánchez-Moreno, "Social Relations and Digital Inclusion: Barriers, Facilitators and Impact on the Interactions Among Older Adults in Spain," J. Evid. Based. Soc. Work, vol. 22, no. 6, pp. 836–853, Nov. 2025, doi: 10.1080/26408066.2025.2521518.

[9] T. Greenhalgh et al., "Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies," J. Med. Internet Res., vol. 19, no. 11, p. e367, Nov. 2017, doi: 10.2196/jmir.8775.

[10] H. Arksey and L. O'Malley, "Scoping studies: Towards a methodological framework," International Journal of Social Research Methodology: Theory and Practice, vol. 8, no. 1, pp. 19–32, Feb. 2005, doi: 10.1080/1364557032000119616.

[11] R. A. Ramsawak, D. K. Behera, and S. K. Nayak, "Digital Health Solutions and Its Usage by Ageing Populations in Asia: A Bibliometric Analysis and Review," Oct. 01, 2025, SAGE Publications Inc. doi: 10.1177/21582440251396495.

[12] B. Ma et al., "Artificial intelligence in elderly healthcare: A scoping review," Jan. 01, 2023, Elsevier Ireland Ltd. doi: 10.1016/j.arr.2022.101808.

[13] D. Levac, H. Colquhoun, and K. K. O'brien, "Scoping studies: advancing the methodology," 2010. [Online]. Available: http://www.cihr-irsc.ca

[14] A. C. Tricco et al., "PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation," Oct. 02, 2018, American College of Physicians. doi: 10.7326/M18-0850.

[15] C. L. Sheppard, C. Kwon, M. Yau, J. Rios, A. Austen, and S. L. Hitzig, "Aging in Place in Social Housing: A Scoping Review of Social Housing for Older Adults," Canadian Journal on Aging, vol. 42, no. 1, pp. 69–79, Mar. 2023, doi: 10.1017/S0714980822000125.

[16] Z. Munn, M. D. J. Peters, C. Stern, C. Tufanaru, A. McArthur, and E. Aromataris, "Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach," BMC Med. Res. Methodol., vol. 18, no. 1, Nov. 2018, doi: 10.1186/s12874-018-0611-x.

[17] T. and I. C. O. G. of J. Council for Science, "[Tentative Translation] Report on The 5 th Science and Technology Basic Plan," 2015.

[18] C. Narvaez Rojas, G. A. Alomia Peñafiel, D. F. Loaiza Buitrago, and C. A. Tavera Romero, "Society 5.0: A Japanese concept for a superintelligent society," Jun. 02, 2021, MDPI AG. doi: 10.3390/su13126567.

[19] Mayumi Fukuyama, "Society 5.0 : Aiming for a New Human Centered Society," Japan Spotlight, 2018, [Online]. Available: http://www8.cao.go.jp/cstp/

[20] Cabinet Secretariat of Japan, "Japan Revitalization Strategy 2016," 2013.

[21] M. Ishihara, S. Matsunaga, R. Islam, O. Shibata, and U. Il Chung, "A policy overview of Japan's progress on dementia care in a super-aged society and future challenges," 2024, National Center for Global Health and Medicine. doi: 10.35772/ghm.2023.01047.

[22] O. Masaaki, "Topics: Recent topics in public health in Japan 2024 Community-based inclusive society and integrated care in Japan: Concepts and challenges for practice," J. Natl. Inst. Public Health, vol. 73, no. 1, pp. 32–41, 2024.

[23] S. L. Foo and G. Pan, "Singapore's vision of a smart nation," 2016. [Online]. Available: https://ink.library.smu.edu.sg/soa_research

[24] N. H. W. Ngiam et al., "Building Digital Literacy in Older Adults of Low Socioeconomic Status in Singapore (Project Wire Up): Nonrandomized Controlled Trial," J. Med. Internet Res., vol. 24, no. 12, p. e40341, Dec. 2022, doi: 10.2196/40341.

[25] Gregoire Virat, "Smart Care at Home: Scaling Singapore AI Home Healthcare for Aging Populations," Eurogroup Consulting.

[26] Z. Jiang and W. Jiang, "Health Education in the Healthy China Initiative 2019−2030," China CDC Wkly., vol. 3, no. 4, pp. 78–80, Jan. 2021, doi: 10.46234/ccdcw2021.018.

[27] W. Lee and Y. Kim, "A Study of the Legal Framework for Digital Inclusion in South Korea," Korea Policy Journal, vol. 23, pp. 36–52, Dec. 2023, doi: 10.62353/kopoj.2023.23.36.

[28] Seung Hyun Kim, "Future Policy Directions for Planning of National Responsibility for Dementia Care," 2017.

[29] OECD Observatory of Public Sector Innovation, "Enhancing Seoul's Age Readiness, the Comprehensive Plan for 50+ Assistance," 2021.

[30] Marketing & Communications, "Thailand Digital Health Transformation Gains Speed."

[31] S. Konglertmongkol, "Mainstreaming Digital Literacy into Ageing Policies: the Way Forward to Empower Older Persons in Thailand," 2024. [Online]. Available: www.dop.go.th

[32] K. Robru, P. Setthasuravich, A. Pukdeewut, and S. Wetchakama, "Internet Use for Health-Related Purposes among Older People in Thailand: An Analysis of Nationwide Cross-Sectional Data," Informatics, vol. 11, no. 3, Sep. 2024, doi: 10.3390/informatics11030055.

[33] S. Jantavongso, "Toward global digital literate citizens: A case of Thailand's aging generation," Electronic Journal of Information Systems in Developing Countries, vol. 88, no. 2, Mar. 2022, doi: 10.1002/isd2.12207.

[34] Ministry of Public Health Qatar, "The National Health Strategy 2018-2022 (Qatar)," 2018.

[35] G. Albahri and H. Alothman, "Elderly in the UAE," Al-Adab Journal, no. 152, pp. 129–164, Mar. 2025, doi: 10.31973/g6596456.

[36] K. Maurya, "From Pixels to Policies: Understanding the Impact of Digital Governance Initiatives in India," 2024.

[37] M. A. Alifiana, M. M. Hanafi, and B. Setiyono, "Digital Entrepreneurship and Financial Performance: Innovation Adoption in Women-Led Indonesian MSMEs," 2025, pp. 273–289. doi: 10.1007/978-981-95-1148-8_18.

[38] European Commission, "Green Paper on Ageing Fostering solidarity and responsability between generations," 2021.

[39] European Union, "European Innovation Partnership on Active and Healthy Ageing," https://digital-strategy.ec.europa.eu/en/policies/eip-aha.

[40] G. Aumayr, "From Ambient Assisted Living to Active and Assisted Living: A Practical Perspective on Experiences and Approaches," 2016, pp. 3–13. doi: 10.1007/978-3-319-39904-1_1.

[41] J. Sattar, "Navigating the Grey Area: Legal Frameworks for Digital Health Monitoring & Use of AI for Elderly Patients in the Nordics," International Journal of Technology and Emerging Sciences, 2024, [Online]. Available: www.mapscipub.com

[42] V. Jormanainen, "Funding Nationwide HIE and HIS: Case Kanta Services 2003–2024 in Finland," 2025. doi: 10.3233/SHTI250134.

[43] Swedish Government Official Reports, Effektiv vård : slutbetänkande. Wolters Kluwer, 2016.

[44] SALAR, "Vision for eHealth 2025," 2025.

[45] Government of Italy, "Piano Nazionale di Ripresa e Resilienza (PNRR) – Missione 6: Salute.," 2025.

[46] Secrétariat Général Pour L'Investissement Et Ministère De La Transition Écologique, "L'évaluation socioéconomique des effets de santé des projets d'investissement public," 2025. [Online]. Available: www.strategie.gouv.fr

[47] S. Gerke, A. D. Stern, and T. Minssen, "Germany's digital health reforms in the Covid-19 era: lessons and opportunities for other countries," Dec. 01, 2020, Nature Research. doi: 10.1038/s41746-020-0306-7.

[48] E. Burk, J. Hornung, and C. Schoppe, "The Digital Act: a boost for digitalisation in German healthcare." Accessed: Feb. 20, 2026. [Online]. Available: https://www.gleisslutz.com/en/know-how/digital-act-boost-digitalisation-german-healthcare

[49] M. Romanyuk, M. Sukharnikova, and N. Chekmareva, "Trends of the digital economy development in Russia," in IOP Conference Series: Earth and Environmental Science, IOP Publishing Ltd, 2021. doi: 10.1088/1755-1315/650/1/012017.

[50] J. Rasmussen, "eHealth Governance - Country Report: Denmark," 2021.

[51] Hon Greg Clark, "Government announces £300 million for landmark ageing society grand challenge," Gov.uk, 2018.

[52] S. Thomas, "The NHS England Long Term Plan implementation framework," British Journal of Neuroscience Nursing, vol. 15, no. 4, pp. 184–186, Aug. 2019, doi: 10.12968/bjnn.2019.15.4.184.

[53] C. Artigas Brugal, "España digital: la hoja de ruta para impulsar un país en clave de futuro," Economia Digital, pp. 352–356, 2023.

[54] E. L. Burd, S. P. Smith, and S. Reisman, "Exploring Business Models for MOOCs in Higher Education," Innov. High. Educ., vol. 40, no. 1, pp. 37–49, 2014, doi: 10.1007/s10755-014-9297-0.

[55] National Coordinator for Health Information Technology, "2020-2025 Federal Health IT Strategic Plan," 2021.

[56] Agewell, "Digital Literacy Interventions for Older Adults in Canada," 2021.

[57] B. B. Neves and G. Mead, "Digital Technology and Older People: Towards a Sociological Approach to Technology Adoption in Later Life," Sociology, vol. 55, no. 5, pp. 888–905, Oct. 2021, doi: 10.1177/0038038520975587.

[58] WHO, "+Simple, digital inclusion for older people," WHO, 2018.

[59] Ministério da Saúde, "Estratégia de Saúde Digital para o Brasil 2020-2028," 2020.

[60] Q. Gloria, "Nearly 4 years in, Uruguay's Plan Ibirapitá promotes digital inclusion for the country's senior citizens," Medium, 2019.

[61] Australia Digital Health Agency, "Australia's National Digital Health Strategy," 2021.

[62] Commonwealth of Australia, "Digital Health Blueprint 2023-2033," 2023, [Online]. Available: http://www.dpmc.gov.au/government/commonwealth-coat-arms

[63] Department of Health and Aged Care, "National Aged Care Data Strategy Acknowledgement of Country," 2023.

[64] A. McCosker et al., "Improving the digital inclusion of older Australians: The social impact of Be Connected," 2020. doi: 10.25916/5ed5b6e204a95.

[65] Associate Minister of Health, Healthy Ageing Strategy. Ministry of Health, 2016.

[66] A. Akinwande, "Successful ageing and trajectories of health among New Zealand older adults," 2022.

[67] Department of Internal Affairs Te Tari Taiwhenua, The Digital Inclusion Blueprint. Department of Internal Affairs Te Tari Taiwhenua, 2019.

[68] African Union, "The Digital Transformation Strategy For Africa (2020-2030)," 2020. [Online]. Available: www.au.int

[69] National Dept Health South Africa, "National Digital Health Strategy for South Africa 2019 - 2024," 2020.

[70] G. Pearce, "The Benefits of National Digital Health in a Short Story," ISACA. Accessed: Nov. 22, 2025. [Online]. Available: https://www.isaca.org/resources/news-and-trends/isaca-now-blog/2024/the-benefits-of-national-digital-health-in-a-short-story?utm_source=chatgpt.com

[71] J. I. ANI and K. Batisai, "Promoting digital inclusion through public-private partnerships for older adults in Nigeria: A review," Aging Health Res., vol. 4, no. 4, Dec. 2024, doi: 10.1016/j.ahr.2024.100211.

[72] United Nations, "UN Decade of Healthy Ageing: Plan of Action," 2021.

[73] International Telecommunication Union, "Ageing in a digital world – from vulnerable to valuable," 2021.

[74] A. J. Scott, "The longevity economy," Dec. 01, 2021, Elsevier Ltd. doi: 10.1016/S2666-7568(21)00250-6.

[75] Oxford Economics, "The Longevity Economy Generating economic growth and new opportunities for business," 2022.

[76] World Health Organization and International Telecommunication Union, "BE HE@LTHY BE MOBILE : A Handbook on how to implement mAgeing," 2018. [Online]. Available: http://apps.who.int/bookorders.

[77] Ministry of Social Development New Zealand, "Better Later Life 2019 - 2034," 2019.