

Sustainable Ageing from Integrative and Multidisciplinary Future Perspectives

Miroslava Tokovská

Andrea Seberíni

Jana Šolcová



Tokovská, Miroslava - Seberíni, Andrea – Šolcová, Jana

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PhDr. Miroslava Tokovská, PhD. Associate Professor, <https://orcid.org/0000-0002-8279-3168>

PhDr. Andrea Seberíni, PhD. Assistant Professor, <https://orcid.org/0000-0002-8531-1611>

Mgr. Jana Šolcová, PhD. Associate Professor, <https://orcid.org/0000-0002-1124-7784>

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Reviewers:

Prof. Dr. Ryszard Sadowski, Rev. PhD., Dsc.

(Faculty of Christian Philosophy at Cardinal Stefan Wyszyński University in Warsaw)

Doc. PhDr. Soňa Šrobárová, PhD., MBA

(St. Elizabeth's University of Health and Social Work in Bratislava, St. Sarah de Marseille Institute)

PaedDr. Tímea Šeben Zatková, PhD.

(Department of Pedagogy, Faculty of Education, Comenius University in Bratislava)

Revision and Proofreading:

Alex Elwood GCLCM

Cover design:

Lisell Stine Alnes

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FOREWORD

In an era of unprecedented demographic transformation, our global society stands at a critical juncture in addressing the needs of ageing populations. *Sustainable Ageing from Integrative and Multidisciplinary Future Perspectives* emerges as a timely contribution to the discourse on one of the most significant societal changes of our time. Drawing on the lens of economics and management, alongside social work, public health, and gerontology, the monograph aims to:

- develop a comprehensive framework that integrates environmental sustainability with healthy ageing practices;
- identify synergies between sustainable development goals and healthy ageing initiatives;
- propose evidence-based recommendations for policymakers on supporting sustainable ageing in different cultural contexts;
- examine how technology can bridge the gap between the ageing population's needs and environmental sustainability.

The complexity of contemporary ageing demands a paradigm shift in how we conceptualise, research, and address the multifaceted challenges accompanying this demographic transition. Often constrained by disciplinary boundaries, traditional approaches can no longer adequately address the interconnected nature of ageing-related issues. This volume presents a groundbreaking framework that integrates diverse perspectives and innovative solutions for sustainable ageing in a world experiencing significant social, health, and environmental threats.

What makes this book particularly valuable is its unique approach to operationalising *sustainable ageing* within the context of current global challenges. It examines how social, health and economic threats can impact the implementation and outcomes of healthy ageing initiatives. Moreover, it explores transdisciplinary strategies that can be deployed to optimise healthy ageing in communities experiencing these challenges. This book builds on this foundation by offering innovative perspectives on how healthy ageing should be approached in a world facing multiple crises.

This volume, through carefully curated chapters, brings together insights from researchers in Slovakia and Norway, guided by the latest scientific knowledge and practical experience across multiple disciplines. While this monograph stems from global demographic and technological trends, the empirical analysis and subsequent recommendations focus specifically on the Central European (Slovakia) and Northern European (Norway) contexts. These specific realities serve as representative models for understanding the dynamics of sustainable ageing within developed European societies. Consequently, while the proposed framework addresses universal challenges, the following policy recommendations are primarily tailored to the European socio-political space, and their application in other global regions should account for local cultural and economic specificities.

Each chapter provides empirical evidence or models to improve stakeholders' understanding of healthy ageing programmes, their vulnerability to various threats, and potential solutions for achieving core goals in challenging contexts.

This work is intended to serve multiple audiences: students and academics will find robust research frameworks; public health professionals can derive practical policy implications; and organisations can utilise the insights for programme development and modification. The transdisciplinary nature of the content ensures its relevance across various fields, from healthcare and social services to policy-making.

The journey toward sustainable ageing requires collective effort, innovative thinking, and integrated approaches. We invite readers to engage with the ideas presented in this volume and to contribute to the ongoing dialogue about creating a more inclusive and supportive world for ageing populations. This monograph aims to inspire new directions in research, policy, and practice in the field of ageing studies, and we welcome you to be part of this important conversation. The original contribution of this monograph lies in the development of a unique integrative model that reconciles previously fragmented perspectives on ageing into a coherent sustainability-oriented framework.

The Authors

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INTRODUCTION

The 21st century marks a demographic transformation, with global populations ageing at a rate never before seen in human history. By 2050, as described by the WHO report *Ageing and Health* (2019), the proportion of people aged 60 and over is projected to nearly double from 12% to 22%, representing over two billion individuals worldwide. This demographic shift transcends national boundaries and economic divisions, affecting both developed and developing nations, though with varying intensities and challenges. Within this global context, significant variations emerge between younger and older nations, reflecting the complex interplay of changing life expectancy, birth rates, living conditions, levels of active ageing, and the financial implications of intergenerational balance. These demographic trends carry profound implications for population replacement, intergenerational interaction, workforce sustainability, the growing need for extended working lives, delayed retirement, and immigration. The situation is further complicated by persistent inequalities faced by first-, second-, and third-generation migrants, alongside the dual challenge of promoting healthy ageing while providing care for those with chronic health conditions in their later years. The implications of this transformation extend far beyond demographics, touching every aspect of society from healthcare systems and economic structures to social institutions and environmental sustainability. This demands a nuanced understanding of how different societies adapt to ageing populations while considering both the opportunities and challenges presented by increased longevity and changing population structures.

Sustainable ageing embodies a paradigm shift in how we conceptualise and approach the ageing process, particularly in the face of contemporary global challenges (Asiamah et al., 2024). It moves beyond traditional models, such as those that focus solely on health maintenance or economic security and embraces a holistic framework that considers the interrelated environmental, social, economic, and personal dimensions of ageing. This concept operationalises sustainable ageing as a framework for understanding how social and health threats – including climate change events, the digitalisation of societies, extreme industrialisation, infectious disease outbreaks, the rise of non-communicable diseases, and war in different countries – may constrain healthy

ageing initiatives and limit their outcomes. Importantly, it also explores potential transdisciplinary strategies that can be implemented to optimise healthy ageing in the face of these threats. While the United Nation's *Decade of Healthy Ageing 2021–2030* (WHO, 2020) initiative is driving major campaigns and includes ten key initiatives to enable people to remain healthy as they age, increasing social and health threats are increasingly hampering their implementation. This situation creates a critical challenge where healthy ageing may not be achieved or sustained, even in traditionally age-friendly contexts experiencing crises. The concept of sustainable ageing, therefore, emphasises not only longevity but also the quality of life and well-being of older adults. It also stresses that current approaches to supporting ageing populations should not compromise the ability of future generations to meet their own needs. This comprehensive perspective encompasses physical health, mental well-being, social engagement, economic security, and environmental stewardship, viewing these elements as interdependent rather than isolated factors within the wider context of global challenges and threats.

The challenges posed by an ageing global population are multifaceted and require an integrated approach that transcends traditional disciplinary boundaries, as evidenced by current research. No single field of study or practice can adequately address the challenges and opportunities presented by global ageing, particularly when considering the convergence of chronic disease management, social determinants of health, and environmental factors. The interconnected nature of these issues necessitates a cross-disciplinary approach: medical science interfacing with technology to enhance healthcare delivery and monitoring (Khan et al., 2024); environmental considerations aligning with urban planning to create age-friendly communities that promote active ageing (Jian et al., 2025); and economic policies integrating with social support systems to ensure financial security and access to care (Kepper et al, 2025).

This integration is of crucial importance, since solutions developed in isolation frequently fail to address the full spectrum of ageing-related challenges, or may even create unintended consequences in other areas. For instance, healthcare interventions focused solely on disease treatment, without considering social isolation or transportation barriers, may have limited effectiveness. The complex interplay between

mental health, physical well-being, and social connectivity demands coordinated responses. Similarly, long-term care solutions must consider both the immediate care needs and the broader implications for family caregivers, healthcare systems, and community resources.

An integrated approach enables the development of more robust, effective, and sustainable solutions that consider the full complexity of ageing in contemporary society. This includes addressing several key dimensions of ageing-related challenges:

- the rising burden of chronic diseases and preventable morbidities;
- mental and cognitive health challenges that require coordinated care approaches;
- caregiving gaps and long-term care system deficiencies;
- health inequities and healthcare access barriers;
- financial security risks and economic sustainability;
- environmental and climate change impacts on older populations;
- social isolation and cultural inclusion needs;
- rights protection and dignity preservation in ageing populations.

This monograph contributes to the field by providing a comprehensive framework that bridges the gap between theoretical understanding and practical implementation in sustainable ageing. Unlike previous works that have typically focused on singular aspects of ageing or innovation, this book brings together research and practice across multiple disciplines to offer a more integrated perspective on the future of ageing. It draws on insights from psychology, public health, gerontology, social science, economics and management, the silver economy, innovation studies, social policy, and technology to set out a coherent roadmap for sustainable ageing in the 21st century. The book not only identifies current challenges and opportunities but also provides concrete strategies for implementing sustainable ageing practices across different societal contexts. Through case studies, theoretical frameworks, and practical applications, it demonstrates how integrated approaches to ageing can create more resilient, adaptable, and sustainable solutions for an ageing world.

1 An Integrative Paradigm of Ageing: From Biological Mechanisms to Socio-Environmental Determinants

This chapter lays the theoretical foundations for understanding ageing through a multidisciplinary lens. The complexity of ageing in contemporary society requires an examination that encompasses biological, psychological, social, environmental, and cultural dimensions. It also explores how different theoretical frameworks contribute to our understanding of the ageing process and its implications for individuals and societies.

1.1 Biological Mechanisms and Health Interventions in Ageing

The biological perspective provides fundamental insights into the complex physiological mechanisms underlying the ageing process. Research by Guo et al. (2022) demonstrates that cellular senescence and molecular deterioration significantly contribute to age-related functional decline. Cellular mechanisms, including telomere shortening, mitochondrial dysfunction, and oxidative stress, have been identified as key drivers of biological ageing (Tenchov et al., 2024; Li et al., 2024). These processes interact with genetic factors and environmental influences to shape individual ageing trajectories.

Table 1.1: Key Biological Mechanisms of Ageing and Their Systemic Effects

Mechanism	Process	Affected Systems	Key References
Telomere shortening	Progressive reduction of protective chromosome caps with each cell division	All organ systems; immune function	Tenchov et al., 2024
Mitochondrial dysfunction	Decline in cellular energy production and increased reactive oxygen species	Cardiovascular, neurological, musculoskeletal	Li et al., 2024
Oxidative stress	Accumulation of damage from reactive oxygen species exceeding repair capacity	Cardiovascular, hepatic, neurological	Guo et al., 2022
Epigenetic modifications	Altered gene expression through DNA methylation and histone modification	Transgenerational, all systems	Galkin et al., 2024; Klibaner-Schiff et al., 2024

Cellular senescence	Irreversible cell cycle arrest with pro-inflammatory secretory phenotype	Immune, integumentary, musculoskeletal	Keshavarz et al., 2023
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Source: Compiled by the authors based on cited literature.

Genetic research has revealed substantial variation in longevity-associated genes across populations. According to Galkin et al. (2024), epigenetic modifications, influenced by lifestyle and environmental factors, can significantly alter gene expression patterns throughout the lifespan. These modifications may explain the heterogeneity observed in ageing outcomes among individuals with similar genetic backgrounds. Klibaner-Schiff et al. (2024) emphasise that environmental health influences not only the current population but also future generations through epigenetically transmitted health outcomes.

According to López-Otín et al. (2023) age-related changes manifest across multiple body systems, affecting physiological homeostasis and functional capacity. Li et al. (2025) document progressive alterations in cardiovascular, musculoskeletal, and neurological systems, which contribute to increased vulnerability to disease and functional limitations. The cumulative impact of these changes presents significant challenges for maintaining health and independence in later life. Medical considerations in age-related conditions have evolved substantially, reflecting an improved understanding of the interactions between biological ageing and disease processes. Research by Keshavarz et al. (2023) highlights the importance of distinguishing between normal ageing processes and pathological conditions, enabling more targeted therapeutic approaches. The growing prevalence of multiple chronic conditions (multimorbidity) in older populations necessitates integrated approaches to medical management.

Preventive strategies and interventions have emerged as crucial elements in promoting healthy ageing, with contemporary research emphasising a multifaceted approach to age-related health management. Studies by Li et al. (2024; 2025) demonstrate that lifestyle modifications, particularly dietary interventions and sustained physical activity, play pivotal roles in modulating biological ageing processes at the cellular and molecular levels. Keshavarz et al. (2023) further highlight that targeting

specific hallmarks of ageing through preventive interventions may effectively delay the onset of age-related diseases. Recent advances in understanding molecular pathways, especially those related to cellular senescence and metabolic regulation, have led to the development of promising therapeutic interventions. These interventions include both pharmacological approaches and lifestyle-based strategies that aim to modify the fundamental aspects of biological ageing. However, Klibaner-Schiff et al. (2024) emphasise that environmental factors significantly influence epigenetic modifications, suggesting that preventive strategies should consider both immediate and long-term transgenerational health impacts. While initial results from various intervention studies appear promising, their long-term efficacy and potential interactions with individual genetic profiles require further longitudinal investigation to establish comprehensive evidence-based guidelines for healthy ageing promotion. The complexity of biological ageing processes underscores the importance of multifaceted interventions that address both molecular mechanisms and systemic changes associated with advancing age.

1.1 Psychological and Cognitive Dimensions of Ageing

The psychological and cognitive dimensions of ageing encompass intricate patterns of change and adaptation across the lifespan. Recent neuropsychological research by Lövdén et al. (2020) demonstrates that cognitive functioning follows distinct trajectories, with some abilities showing decline while others remain stable or improve with age and education. Furthermore, they find that crystallised intelligence, including vocabulary and accumulated knowledge, often remains stable or improves into advanced age, while fluid intelligence components such as processing speed and working memory typically show a gradual decline. The differential trajectories of cognitive abilities in ageing can be summarised as follows: abilities that tend to remain stable or improve include crystallised intelligence (vocabulary, accumulated knowledge, expertise), emotional regulation and interpersonal skills, and autobiographical and semantic memory. By contrast, abilities that typically show age-related decline include fluid intelligence (abstract reasoning, novel problem solving), processing speed and reaction time, working memory capacity and divided attention. Importantly, Li et al. (2024) establish that cognitive plasticity – the brain's ability to adapt and form new neural connections – persists throughout life, meaning that decline in the second

category is neither inevitable nor irreversible. This distinction between preserved and declining cognitive functions is fundamental to understanding which interventions are most likely to support cognitive health in ageing populations.

Learning and cognitive plasticity represent particularly promising areas of investigation. Current neuroscience research demonstrates that the ageing brain maintains a considerable capacity for adaptation and growth. Weaver & Jaeggi (2021) document significant cognitive improvements in older adults engaged in structured learning activities, challenging traditional assumptions about fixed cognitive decline. Their findings suggest that targeted interventions promoting cognitive engagement can enhance neural plasticity and cognitive reserve well into advanced age. The researchers emphasise that cognitive stimulation through lifelong learning and intellectual engagement can help maintain cognitive function. Klibaner-Schiff et al. (2024) further highlight how environmental factors and lifestyle choices significantly influence cognitive trajectories, suggesting that cognitive decline is not an inevitable consequence of ageing.

Social and emotional factors play a crucial role in cognitive health during later life. Vogel & Zank (2025) demonstrates that higher levels of social engagement and emotional well-being serve as protective factors against cognitive decline. Psychological resilience and effective adaptation strategies are instrumental in maintaining cognitive function, with research showing that older adults who maintain active social connections and engage in meaningful activities demonstrate better cognitive outcomes. Willroth et al. (2023) emphasise that psychological well-being strongly correlates with cognitive resilience and serves as a protective factor against future dementia. Additionally, emotional regulation capabilities often improve with age, contributing to better psychological adaptation despite physical or cognitive challenges. The relationship between cognitive function and life satisfaction appears bidirectional. Papi & Cheraghi (2021) demonstrate that maintaining cognitive engagement through lifelong learning and social interaction not only supports cognitive health but also enhances overall psychological well-being and life satisfaction in older adults. This suggests that interventions targeting both psychological and cognitive domains may be most effective in promoting successful ageing. Studies by Isaacowitz (2022) and Livingstone &

Isaacowitz (2021) reveal that older adults often report higher levels of emotional regulation and life satisfaction despite facing various age-related challenges. However, contemporary research emphasises the importance of addressing mental health concerns specific to this life stage, including depression, anxiety, and adjustment disorders, which may manifest differently than in younger populations. Mack et al. (2025) demonstrate that structured mental health interventions tailored specifically for older adults show promising results in improving both cognitive function and emotional well-being. Healthcare providers increasingly recognise the need for age-specific mental health screening tools that account for the unique presentation of psychological symptoms in older populations. The integration of digital mental health resources and telehealth services has shown particular promise in reaching older adults who may face mobility or transportation barriers to accessing traditional mental health care.

Adaptation and resilience emerge as crucial factors in successful ageing. Recent longitudinal studies have identified key mechanisms through which older adults navigate life transitions and challenges. Trică et al. (2024) highlight that psychological resilience often strengthens with age, supported by accumulated life experience and refined coping strategies. This enhanced adaptability contributes significantly to maintaining well-being despite physical or social changes. Research by Menassa et al. (2023) indicates that older adults actively reconstruct their self-image in response to changing roles, relationships, and capabilities. This dynamic process of identity maintenance and adaptation plays a crucial role in psychological well-being and social engagement. Contemporary approaches increasingly recognise the importance of personalised interventions that take into account individual differences in cognitive profiles, emotional needs, and adaptive capacity. The field continues to evolve, incorporating new findings from neuroscience and psychological research to promote optimal psychological functioning across the lifespan.

1.2 Social and Cultural Contexts of Ageing

The social and cultural contexts of ageing have a significant impact on how individuals experience and navigate later life, shaping everything from daily interactions to long-term well-being. Research consistently shows that social roles and relationships

change significantly during the ageing process. According to Froidevaux et al. (2018), older adults often experience role transitions that require significant psychological adjustment, such as retirement, grandparenthood, and changes in marital status. These transitions can either enhance or challenge an individual's sense of identity and purpose, depending on various personal and environmental factors.

Cultural differences in the experience of ageing show remarkable diversity across societies. Cross-cultural research by Hartanto et al. (2024) reveals significant differences in how different societies and cultures conceptualise and value ageing. For example, in many East Asian cultures, older adults traditionally maintain central family roles and are given high social status, whereas Western societies often emphasise independence and individual achievement.

Table 1.2: Cultural Orientations Toward Ageing: Contrasting Paradigms

Dimension	Collectivist Orientation (e.g. East Asian)	Individualistic Orientation (e.g. Western)
Social status of older adults	High; elders as wisdom holders and decision-makers	Variable; often associated with decline and dependency
Primary care model	Family-centred; multigenerational household	Institutional and state supported; independent living
Valued attributes in later life	Experience, mentorship, family leadership	Autonomy, productivity, self-sufficiency
Retirement identity	Continuation of family/community role	Role loss requiring psychological adjustment
Impact of globalisation	Erosion of traditional filial piety; hybrid models emerging	Growing recognition of active ageing; policy emphasis

Source: Adapted from Hartanto et al. (2024); Kornadt et al. (2022).

These contrasting orientations are not static; as Kornadt et al. (2022) observe, globalisation and modernisation are increasingly producing hybrid approaches that blend collectivist and individualist elements in complex ways.

The impact of ageism and age-related stereotypes is a persistent challenge to well-being in later life. Extensive research by Gans et al. (2023) show that exposure to negative age stereotypes can significantly affect the physical health, cognitive

performance and social behaviour of older adults. Their work shows how internalised ageism can lead to reduced self-efficacy and reduced participation in health-promoting activities. Recent intervention studies by Rodriguez et al. (2024) show promising results in combating ageist attitudes through cross-generational programmes and public education initiatives, highlighting the crucial role intergenerational relationships and support systems play in successful ageing. Longitudinal studies by Hartanto et al. (2024) show that strong intergenerational ties contribute significantly to the psychological and social well-being of older adults, suggesting that such support provides both practical assistance and emotional satisfaction. Patil & Mishra (2025) emphasises that changing family structures and increasing geographical mobility may challenge traditional support systems, requiring new approaches to maintaining ties across generations. However, Kornadt et al. (2022) point out that globalisation and modernisation are increasingly influencing traditional age-related cultural practices, creating complex hybrid approaches to ageing in different societies.

Social participation and engagement are emerging as critical factors in promoting healthy ageing. Research by Weaver & Jaeggi (2021) shows that continued social engagement in later life is strongly correlated with improved cognitive function, lower rates of depression, and increased longevity. Their findings suggest that maintaining meaningful social roles and participating in community activities serve as protective factors against various age-related challenges. In addition, Wilson et al. (2023) and Yang et al. (2025) document how digital technologies are creating new opportunities for social engagement among older adults, although access and digital literacy remain significant concerns. These social and cultural dimensions of ageing highlight the need for nuanced, culturally sensitive approaches to supporting older adults. As societies continue to evolve, understanding and addressing these complex social factors will become increasingly important in promoting positive ageing experiences. Current research highlights the importance of developing interventions that recognise cultural diversity, support intergenerational relationships, and actively challenge ageist attitudes to improve the quality of life of older adults in different social contexts.

1.3 Environmental and Ecological Perspectives on Ageing

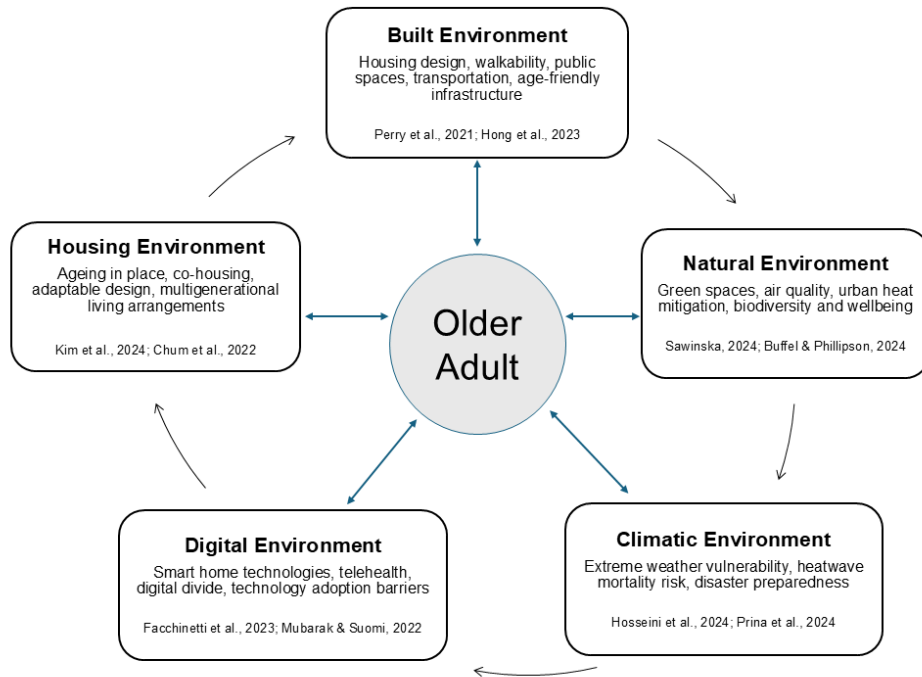
The relationship between environmental factors and ageing populations has emerged as a critical area of research, highlighting the complex interactions between older adults and their surroundings. Recent studies demonstrate how various environmental dimensions significantly influence the ageing process and quality of life in later years. Built environments and age-friendly communities play a crucial role in supporting successful ageing. Research by Perry et al. (2021) reveals that well-designed urban spaces can significantly enhance older adults' independence and social participation. Their longitudinal study demonstrates how accessible transportation systems, walkable neighbourhoods, and public spaces with adequate seating and lighting contribute to improved physical activity levels and social engagement among older residents. Furthermore, Hong et al. (2023) document that age-friendly infrastructure modifications can reduce fall risks and increase community participation by up to 40% among adults aged 65 and older.

Environmental sustainability intersects significantly with the ageing population's needs. Sawinska (2024) and Buffel & Phillipson (2024) examine how sustainable urban development can address the specific requirements of older adults while promoting ecological responsibility. Their research indicates that green spaces not only provide recreational opportunities but also help mitigate urban heat island effects, which disproportionately affect older populations. Moreover, Boffi et al. (2021) demonstrate that sustainable housing designs incorporating natural ventilation and energy-efficient systems can reduce both environmental impact and living costs for older residents. Housing and living arrangements therefore emerge as fundamental factors in successful ageing, providing essential physical, social and psychological support structures for older adults (Chum et al., 2022). Research indicates that appropriate housing models can enhance the quality of life of older adults through facilitated social connections, accessible physical environments, and opportunities for maintaining independence. Community-based housing solutions that incorporate features like shared spaces, support services, and age-appropriate design contribute significantly to older adults' well-being and ability to age in place (Forsyth & Molinsky, 2020). The built environment and social context of living arrangements directly impact individuals' capacity to maintain

autonomy, engage in meaningful activities, and develop supportive relationships as they age. Their findings suggest that flexible living arrangements, including co-housing and multigenerational living spaces, can enhance social support while maintaining autonomy. Furthermore, Kim et al. (2024) document the growing importance of adaptable housing designs that accommodate changing physical needs while supporting ageing in place.

Climate change presents particular challenges for ageing populations. Comprehensive research by Hosseini, Zargoush & Ghazalbash (2024) shows that older adults face increased vulnerability to extreme weather events and changing climate patterns. Their findings indicate that heatwaves and air pollution disproportionately affect those aged 70 and above, with significant implications for healthcare systems and community support services. Prina et al. (2024) further document how climate-related displacement particularly impacts older adults, highlighting the need for age-sensitive disaster preparedness and response strategies. Technology and digital environments increasingly shape the ageing experience. Studies by Facchinetti et al. (2023) and Rybenska et al. (2024) demonstrate how smart home technologies and digital health monitoring systems can enhance independent living capabilities among older adults. Mubarak & Suomi (2022) caution that the digital divide remains a significant concern, with socioeconomic factors influencing technology access and adoption rates among different older adult populations. Their research emphasises the importance of developing inclusive digital solutions that consider varying levels of technological literacy and accessibility needs. The environmental dimensions influencing ageing outcomes are illustrated in Figure 1.1.

Figure 1.1: Environmental Dimensions Influencing Ageing Outcomes



Source: Compiled by the authors based on cited literature.

Notes: Arrows indicate bidirectional interactions between environmental dimensions and the older adult, as well as between dimensions themselves (outer connections).

1.4 Economic and Policy Dimensions of Ageing

The economic and policy dimensions of ageing encompass the financial sustainability of healthcare systems, pension structures, labour market participation, and intergenerational equity. As populations age, these dimensions interact in complex ways: deteriorating old-age dependency ratios pressure pay-as-you-go pension systems, rising chronic disease prevalence drives healthcare expenditure upward, and shrinking working-age populations reduce the fiscal base for expanding social protection needs. In the absence of policy action to cut age-related spending, median net general government debt will rise to 101% of GDP in advanced economies and 156% in emerging economies by 2060 (Tilleray et al., 2023). The pace of structural reform has slowed as governments have focused on competing priorities, yet without continued or

new policy measures, the worsening demographic outlook increases the risk that age-related expenditure becomes unsustainable for some sovereigns.

While old-age dependency ratios and age-related expenditure remain notably lower in emerging economies rather than in advanced economies in absolute terms, their rate of increase is far steeper on average, implying that the policy adjustment required to offset ageing pressures is currently greater for emerging market sovereigns. Rising age-related expenditure could become unsustainable for several sovereigns amid declining fertility rates, rising interest levels, and steep government debt. Healthcare expenditure per capita, expressed in purchasing power standards, has increased consistently across all European country groups between 2011 and 2021, with countries operating mandatory public health insurance systems recording an average increase of approximately 50% over this period (Eurostat, 2023).

The relationship between healthcare spending and population health outcomes, however, is not straightforward. Research demonstrates that the allocation of expenditure matters at least as much as its volume. Countries that invest a larger share of healthcare budgets in preventive care tend to achieve lower rates of avoidable mortality, even when their overall healthcare spending as a proportion of GDP is comparable to or lower than that of countries prioritising curative approaches (OECD, 2025). Wang & Wang (2021) estimated that the optimal level of preventive expenditure for OECD countries stands at approximately 1.175% of gross national product, a threshold that many countries, particularly in Central and Eastern Europe, fall substantially below. This evidence underscores that the fiscal sustainability of ageing societies depends not solely on controlling expenditure growth but on strategically redirecting resources toward interventions that reduce the downstream burden of chronic disease.

Policy responses to demographic pressures have typically focused on extending working lives through raised retirement ages, restricting early retirement pathways, and promoting active ageing in the labour market. However, the effectiveness of such measures depends critically on complementary investments in preventive healthcare, age-friendly workplace design, and lifelong learning that enable older adults to remain

productively employed (Foster & Walker, 2021). Without these enabling conditions, formal policy changes risk imposing legal obligations without the practical infrastructure to support them. The productive ageing literature emphasises that older adults contribute substantially to economic output through formal employment, volunteer work, family caregiving, and civic engagement, and that these contributions are systematically undervalued in conventional economic accounting (Morrow-Howell & Sun, 2022; Mathews, 2024). Klimczuk (2021) further argues that the emergence of a “silver economy” – encompassing goods, services, and market innovations designed for ageing populations – represents not merely a response to demographic challenge but a constructive economic opportunity that can generate employment, stimulate innovation, and improve quality of life.

The digital transformation of labour markets introduces a further dimension of economic complexity for ageing societies. As workplaces become increasingly digitalised, older workers who lack adequate digital skills face heightened risks of premature labour market exit, with consequences for both individual pension entitlements and aggregate fiscal sustainability. Moilanen et al. (2021) document that older employees experiencing significant technostress are substantially more likely to consider early retirement, representing a direct fiscal cost through reduced contribution years and extended pension receipt. This digital dimension of economic exclusion operates as a life-course continuum: inadequate support for workplace digitalisation in mid-career translates into reduced digital confidence at retirement and progressively deepening consumer exclusion in later life (Komp-Leukkunen, 2023). The economic costs of digital exclusion among older adults thus extend beyond the labour market to encompass reduced access to financial services, healthcare, and essential consumer markets.

Gender inequalities constitute a particularly significant dimension of the economic landscape of ageing. Women disproportionately bear the burden of informal caregiving; globally, 606 million women, compared to 41 million men, were out of the labour force due to caregiving responsibilities (Browne et al., 2022). Such caregiving interrupts employment trajectories, reduces pension accumulation, and creates economic vulnerabilities that compound over the life course. As societies age and the demand for

elder care intensifies, women in low- and middle-income countries are especially likely to leave the workforce to provide care, further widening the gender gap in economic security in later life. Addressing these inequalities requires policy interventions that recognise the economic value of care work, invest in formal long-term care infrastructure, and support flexible employment arrangements that enable continued labour market participation alongside caregiving responsibilities (Browne et al., 2022).

Long-term care financing represents a particularly acute challenge, as demand for both formal and informal care grows with population ageing while workforce availability for care provision simultaneously contracts. The projected 4.2% annual increase in global healthcare spending through 2030 is driven primarily by the needs of older populations (Hanson et al., 2022), and the burden of multimorbidity among older adults intensifies pressure on healthcare budgets across European countries (Iuga, Nerişanu, & Iuga, 2024). Hayek et al. (2023) provide evidence that economic evaluations of ageing-related interventions must account for both direct healthcare costs and the broader societal costs of lost productivity, informal care provision, and reduced social participation. Achieving financial sustainability in ageing societies therefore requires not only fiscal reform but a fundamental reorientation toward prevention, community-based care, and the recognition of older adults as economic contributors rather than solely as recipients of public expenditure.

1.5 Integration of Perspectives on Ageing

The multifaceted nature of ageing necessitates an integrated framework that acknowledges the complex interactions between biological, psychological, social, and environmental dimensions. Recent research demonstrates how these various perspectives interconnect to shape the ageing experience. Biological processes, including cellular senescence and epigenetic modifications, are significantly influenced by environmental factors and lifestyle choices (Galkin et al., 2023; Klibaner-Schiff et al., 2024). This biological foundation interacts dynamically with psychological and cognitive functions, as evidenced by research showing how social engagement and environmental conditions can modulate cognitive decline (Lövdén et al., 2024; Helliwell et al., 2024). A systems-thinking approach reveals how these dimensions create

feedback loops that influence ageing outcomes. For instance, the built environment directly impacts physical activity levels and social participation (Perry et al., 2021), which in turn affects biological health markers and psychological well-being (Hong et al., 2023). Similarly, social and cultural contexts shape how individuals adapt to age-related changes, with research by Hartanto et al. (2024) demonstrating that cultural values and intergenerational relationships significantly influence both psychological resilience and physical health outcomes.

Table 1.3: Cross-Dimensional Interactions in Ageing: Examples of Feedback Loops

Dimension A	Dimension B	Interaction Mechanism	Evidence
Biological	Environmental	Epigenetic modifications shaped by environmental exposures across the life course	Galkin et al., 2024; Klibaner-Schiff et al., 2024
Environmental	Social	Built environment design facilitates or constrains social participation and physical activity	Perry et al., 2021; Hong et al., 2023
Social	Psychological	Social engagement protects against cognitive decline; loneliness accelerates it	Helliwell et al., 2024; Weaver & Jaeggi, 2021
Psychological	Biological	Psychological resilience and stress management modulate inflammatory markers and immune function	Willroth et al., 2023; Trică et al., 2024
Cultural	Social	Cultural values shape intergenerational support patterns and care expectations	Hartanto et al., 2024; Kornadt et al., 2022
Economic	Environmental	Financial resources determine housing quality and access to age-friendly environments	Kim et al., 2024; Chum et al., 2022

Source: Compiled by the authors based on cited literature.

Holistic models of successful ageing emphasise the importance of considering multiple domains simultaneously. The interaction between cognitive plasticity and social engagement (Weaver & Jaeggi, 2021) demonstrates how psychological and social factors combine to support healthy ageing. Environmental considerations, including housing design and community structure, further contribute to this integrated model by facilitating or constraining opportunities for social interaction and physical activity (Kim et

al., 2024). The life-course perspective provides a temporal framework for understanding how these various dimensions evolve and interact over time. Longitudinal research indicates that early life experiences and ongoing environmental exposures influence biological ageing through epigenetic modifications (Tenchov et al., 2024; Li et al., 2024). This perspective also highlights how psychological adaptation strategies develop over time, with older adults often showing improved emotional regulation despite facing various age-related challenges (Trică et al., 2024).

Future directions in ageing research increasingly focus on understanding the complex interactions between these different dimensions. Emerging areas include the investigation of how digital environments influence social connections and cognitive function (Rybenska et al., 2024), the impact of climate change on ageing populations (Hosseini, Zargoush & Ghazalbash, 2024), and the development of integrated interventions that address multiple domains simultaneously. The challenge lies in developing research methodologies that can effectively capture these complex interactions while accounting for individual variations in ageing trajectories.

The section concludes by emphasising the importance of maintaining a multidimensional perspective when addressing ageing-related challenges and opportunities. This integrated perspective suggests that successful ageing initiatives should adopt multifaceted approaches that address biological, psychological, social, and environmental factors concurrently. Such comprehensive strategies are more likely to support positive ageing outcomes than interventions focused on single domains in isolation.

2 Ageing Conceptual Frameworks

The multidimensional perspectives examined in Chapter 1 provide the analytical foundation for understanding the diversity of conceptual frameworks that have emerged in ageing research. This chapter examines these frameworks in detail, tracing their theoretical roots and practical implications.

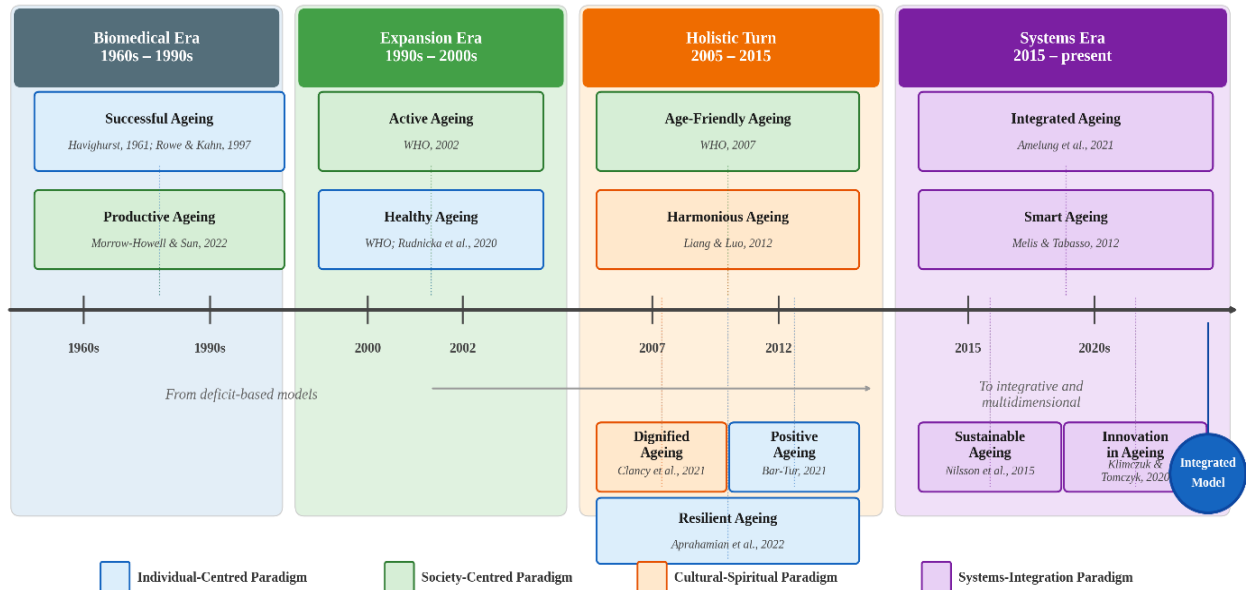
The conceptualisation of ageing has undergone significant transformation over the past decades, evolving from deficit-based models to more holistic and empowering frameworks. This evolution reflects broader shifts in understanding human development as a lifelong process and recognises the diverse experiences, resources, and potentials that characterise later life. As Menassa et al. (2023) demonstrate in their systematic review of healthy ageing models, there is considerable heterogeneity in how ageing concepts are defined and operationalised across different contexts and populations. This chapter examines the major conceptual frameworks that have emerged to understand and promote optimal ageing, analysing their theoretical foundations, practical applications, and contributions to contemporary discourse on sustainable ageing.

The proliferation of ageing frameworks reflects both the complexity of the ageing process and the recognition that traditional biomedical models, which primarily focused on disease and decline, are insufficient for capturing the multidimensional nature of later life experiences. Contemporary frameworks acknowledge that ageing occurs within dynamic person–environment interactions and involves continuous adaptation processes across multiple life domains (Gaviano et al., 2024b) and across subjective and objective dimensions: cognitive, physical, psychological, social, environmental, political, cultural, economic, demographic and spiritual.

The theoretical underpinnings of these frameworks draw from diverse disciplines, including gerontology, psychology, sociology, public health, and environmental science. These disciplines share common themes around empowerment, agency, resilience, and the importance of supportive environments, whilst differing in their emphasis on specific dimensions or outcomes. Understanding these frameworks is crucial for developing comprehensive approaches to sustainable ageing that can address the complex

challenges facing contemporary societies. Figure 2.1 illustrates the chronological evolution of these frameworks, tracing the shift from deficit-based biomedical models toward increasingly integrative and multidimensional approaches.

Figure 2.1: Chronological Evolution of Ageing Conceptual Frameworks



Source: Compiled by the authors. Framework emergence dates are approximate and reflect earliest major publications. Note: colour coding corresponds to the four paradigmatic domains of the Integrated Model (Section 2.14.).

2.1 Active Ageing

Active ageing represents one of the most influential frameworks in contemporary gerontology, pioneered by the World Health Organisation (WHO) and subsequently adopted globally as a policy framework for addressing population ageing. The WHO (2002) defines active ageing as the process of optimising opportunities for health, participation, and security to enhance quality of life as people age, a definition further elaborated by Paúl et al. (2012). This framework fundamentally shifts focus from a passive, dependency-oriented view of ageing to one that emphasises continued engagement, contribution, and empowerment throughout the life course. The active ageing paradigm rests on three foundational pillars: health, participation, and security (WHO, 2002). Health encompasses not merely the absence of disease but includes

physical, mental, and social well-being. Participation refers to continued involvement in social, economic, cultural, spiritual, and civic affairs, extending beyond traditional notions of productive employment. Security encompasses the protection, safety, and dignity of older persons across multiple domains, including financial security, physical safety, and social protection systems.

The framework emphasises that active ageing applies throughout the life course and recognises that people age as individuals and as members of groups. Barbaccia et al. (2022) stressed that the word 'active' refers to continuing participation in social, economic, cultural, spiritual, and civic affairs, not just being physically active or participating in the labour force. This broad conceptualisation allows for diverse pathways to active ageing that accommodate individual differences in health status, capabilities, and life circumstances. The active ageing framework has been instrumental in shaping policy responses to population ageing worldwide. It has influenced the development of age-friendly cities initiatives, lifelong learning programmes, and intergenerational solidarity projects. However, critics have noted that the framework may inadvertently create new forms of ageism by establishing normative expectations about how older people should behave and contribute to society (Barber et al., 2024). Additionally, the emphasis on activity and participation may not adequately account for the realities of those experiencing significant health challenges or social disadvantage. Recent developments in active ageing research have begun to address these concerns by incorporating greater attention to diversity, equity, and inclusion. Foster & Walker (2021) and Wongsala et al. (2021) have called for more nuanced understandings that recognise different pathways to active ageing and acknowledge the structural factors that may constrain or enable active ageing opportunities for different populations.

2.2 Age-Friendly Ageing

Age-friendly ageing emerges from the recognition that environments play a crucial role in determining whether people can age actively and well (WHO, 2020). This framework, closely associated with the WHO's Age-Friendly Cities and Communities programme, focuses on creating physical and social environments that support and enable people to age in place with dignity, security, and continued participation in

community life. The age-friendly framework, as described by Van Hoof et al. (2021) is built around eight interconnected domains: outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information, and community support and health services. These domains collectively address the environmental factors that can either support or hinder older people's ability to maintain independence, participate in community life, and age with dignity.

Central to the age-friendly approach is the principle of universal design – creating environments that are accessible and usable by people of all ages and abilities. This approach recognises that what is good for older people is generally good for everyone, promoting inclusive design that benefits entire communities (Hellevang & Gamme, 2019). The framework emphasises consultation with older people themselves in identifying barriers and solutions, ensuring that interventions are responsive to actual needs and preferences rather than assumptions about what older people require. The age-friendly movement has gained considerable momentum globally, with thousands of cities and communities joining the WHO Global Network for Age-Friendly Cities and Communities (WHO, 2018). Implementation typically involves assessment of current age friendliness, development of action plans with community stakeholders, and ongoing monitoring and evaluation. Research has demonstrated positive outcomes from age-friendly initiatives, including improved quality of life, enhanced social connectivity, and better health outcomes for older residents. However, the age-friendly framework faces challenges in implementation, particularly in resource constrained settings or communities with competing priorities. There are also questions about how to balance the specific needs of older people with broader community development goals, and how to ensure that age-friendly initiatives do not inadvertently segregate or marginalise older people.

2.3 Dignified Ageing

Dignified ageing centres on the fundamental principle that all people, regardless of age, deserve to be treated with respect, dignity, and recognition of their inherent worth as human beings (Clancy et al., 2021). This framework emphasises the

importance of maintaining autonomy, self-determination, and personal identity throughout the ageing process, whilst acknowledging that these may manifest differently at various life stages and in different circumstances. The concept of dignified ageing is deeply rooted in human rights frameworks and ethical principles that recognise the inherent dignity of all persons. It challenges ageist attitudes and practices that diminish or devalue older people, instead promoting perspectives that honour the wisdom, experience, and continued potential of older adults. This framework is particularly relevant in addressing elder abuse, discrimination, and neglect, providing a foundation for advocacy and policy development.

Dignified ageing encompasses several key dimensions: respect for autonomy and decision-making capacity, recognition of individual identity and life history, protection from harm and exploitation, and access to resources and opportunities that support quality of life (Seedsman, 2019; Clancy et al., 2021). It also includes the right to privacy, confidentiality, and control over personal information and care decisions. These principles apply across all settings where older people live, work, and receive care. The framework has important implications for service delivery, emphasising person-centred approaches that respect individual preferences, values, and goals. It challenges institutional practices that may compromise dignity, such as routine rather than individualised care, lack of privacy, or failure to involve older people in decisions affecting their lives. According to Muñoz Terrón (2021), dignified ageing also extends to end-of-life care, supporting the right to die with dignity according to one's own values and wishes.

Implementation of dignified ageing principles requires systemic changes in attitudes, policies, and practices across multiple sectors. This includes training for healthcare and social service providers, development of rights-based policies and procedures, and creation of advocacy mechanisms that protect and promote the dignity of older people. The framework also emphasises the importance of addressing social determinants that may compromise dignity, such as poverty, social isolation, and inadequate housing.

2.4 Harmonious Ageing

Harmonious ageing reflects an alternative approach to understanding the concept of ageing, drawing particularly from Eastern philosophical traditions that emphasise balance, integration, and harmony between different aspects of life (Liang & Luo, 2012). This framework builds upon foundational concepts from life balance and harmony research, which provide an excellent theoretical foundation for developing this approach to optimal ageing. The concept of balance and harmony runs as a golden thread through all dimensions of well-being, making these principles particularly relevant for understanding positive ageing experiences (Lomas, 2021).

The harmonious ageing framework emphasises achieving dynamic balance across multiple life domains, including physical health, emotional well-being, social relationships, spiritual development, and environmental harmony. Unlike Western approaches that often treat physical and mental health separately, this framework promotes an integrated relationship between body and mind (Liang & Luo, 2012). The approach recognises that optimal ageing may involve accepting and adapting to changes and limitations rather than simply maintaining youthful characteristics or high levels of activity. Wisdom, acceptance, and inner peace become equally important markers of positive ageing as physical health or social engagement.

Central to harmonious ageing is person-environment fit, recognising that optimal ageing occurs when there is congruence between individual capabilities and environmental demands. The framework emphasises the interdependent nature of human beings and the importance of intergenerational relationships (Liang & Luo, 2012). This includes both receiving support from younger generations and contributing wisdom and care to others, valuing continuity with cultural traditions whilst embracing necessary adaptations. The harmonious ageing framework offers valuable insights for developing culturally responsive approaches to ageing, particularly where traditional Western models may not align with local values and practices. While balance and harmony concepts may be more universally valued than often realised, they have been relatively underappreciated due to Western-centric approaches (Lomas, 2021). This framework provides a foundation for integrating different cultural perspectives and

developing more inclusive models that recognise diverse pathways to well-being in later life.

2.5 Healthy Ageing

Healthy ageing has emerged as a central organising concept in contemporary gerontology and public health, representing a shift from disease-focused approaches to more holistic models that emphasise functional ability, well-being, and quality of life (Menassa et al., 2023). The concept has been recurrently and heterogeneously conceptualised in the literature, with consensus that healthy ageing depends on personal characteristics, resources, goals, and context-specific factors across subjective and objective dimensions.

The WHO's current definition of healthy ageing emphasises the process of developing and maintaining functional ability that enables well-being in older age (Rudnicka et al., 2020). Functional ability is determined by the intrinsic capacity of the individual (the combination of all their physical and mental capacities), relevant environmental characteristics, and the interaction between them. This definition shifts focus from disease absence to functional capacity and environmental support, recognising that people can age healthily even in the presence of chronic conditions.

Menassa et al. (2023) describe three main types of healthy ageing models: those focusing on health outcomes, those emphasising adaptations throughout the life course, and hybrid approaches that combine both perspectives. Models emphasising adaptation throughout the life course define healthy ageing as a pathway of adaptive, compensatory, and developmental processes to changing environments and goals across multiple life dimensions. Healthy ageing encompasses multiple dimensions, including physical health, cognitive function, psychological well-being, social connections, and environmental factors (Gianfredi et al., 2025). The framework recognises that healthy ageing is not simply the result of individual choices but is influenced by social determinants of health, including income, education, housing, and access to healthcare and social services. This broader perspective has important implications for policy and intervention development.

The life course perspective is central to healthy ageing frameworks, recognising that health in later life is influenced by exposures and experiences throughout the entire lifespan. This includes genetic factors, early life experiences, educational and occupational exposures, lifestyle choices, and access to health-promoting resources. The framework emphasises that interventions to promote healthy ageing should begin early in life and continue throughout the life course. Contemporary approaches to healthy ageing increasingly emphasise health promotion and empowerment activities as central to strengthening resilience and improving reserve capacities across cognitive, physical, psychological, cultural, demographic, economic, social, and spiritual dimensions. This includes community-based approaches that engage older adults as active participants in designing and implementing health promotion programmes.

2.6 Integrated Ageing

Integrated ageing signifies a comprehensive framework that emphasises the coordination and integration of services, policies, and approaches across different sectors and life domains to support optimal ageing outcomes (Amelung et al., 2025). This framework recognises that ageing affects multiple aspects of life simultaneously and that effective responses require coordinated action across healthcare, social services, housing, transportation, education, and other sectors.

The integrated ageing approach is built on the recognition that older people's needs are often complex and multifaceted, requiring responses that address multiple domains simultaneously rather than through fragmented, single-issue interventions (WHO, 2019). This includes integration across different levels of care (primary, secondary, tertiary), different types of services (health, social, housing), and different sectors (public, private, voluntary).

Key principles of integrated ageing include: person-centred approaches that organise services around individual needs and preferences rather than institutional convenience; continuity of care across different providers and settings; coordination between different professionals and services; and comprehensiveness in addressing the full range of factors affecting ageing outcomes (Stoop et al., 2020). As Lawless et al. (2020) noted, the framework also emphasises the integration of different types of

knowledge and expertise, including professional knowledge, experiential knowledge from older people and their families, and community knowledge about local resources and challenges. This participatory approach ensures that interventions are responsive to actual needs and preferences whilst building on existing strengths and resources. Integrated ageing has important implications for policy development, requiring coordination across different government departments and levels of government. It also requires new models of service delivery that can effectively coordinate care across multiple providers and settings. Technology is increasingly playing a role in supporting integration through electronic health records, care coordination platforms, and communication systems that facilitate information sharing between providers.

2.7 Positive Ageing

Positive ageing emerges from positive psychology traditions that emphasise strengths, resilience, and well-being rather than focusing primarily on problems, deficits, or pathology (Bar Tur & Malkinson, 2014). This framework describes positive ageing as psychological adaptation to the inevitable consequences of late life decline, emphasising the ability to recruit latent potentiality and respond flexibly to age-related transitions (Bar Tur, 2021). The positive ageing framework is grounded in research demonstrating that many people maintain or even improve various aspects of functioning and well-being as they age, despite facing challenges and losses (Crăciun, 2023b). This includes research on wisdom, emotional regulation, selective optimisation with compensation, and post-traumatic growth. The framework recognises that ageing can involve continued development, learning, and contribution rather than simply decline and withdrawal.

Central to positive ageing is the concept of resilience – the ability to adapt successfully to adversity, stress, and significant life changes (Hayman, Kerse & Consedine, 2016). This includes both the capacity to bounce back from difficulties and the ability to grow and develop through challenging experiences. Research has identified multiple factors that contribute to resilience in later life, including social connections, sense of purpose, adaptive coping strategies, and access to resources and support (MacLeod et al., 2016).

The positive ageing framework emphasises the importance of meaning-making and purpose in later life. This includes finding new sources of meaning as roles and responsibilities change, contributing to others and society, and maintaining a sense of identity and continuity despite physical and social changes. Research suggests that maintaining a sense of purpose is associated with better health outcomes, longer life expectancy, and greater life satisfaction (Bar Tur, 2021; Crăciun, 2023a). Positive ageing also recognises the potential for continued growth and development throughout the life course. This includes intellectual growth through continued learning, emotional growth through increased emotional regulation and wisdom, social growth through deepened relationships and expanded perspectives, and spiritual growth through increased transcendence and meaning-making.

2.8 Productive Ageing

Productive ageing focuses on the continued capacity of older people to contribute to society through paid and unpaid work, family support, civic engagement, and other forms of social participation (Morrow-Howell & Sun, 2022). This framework recognises that older adults can be economically productive through various activities including work, volunteering, and caregiving that are beneficial for personal and social development (Mathews, 2024). The productive ageing framework emerged partly in response to concerns about population ageing and its potential economic impacts (Dommaraju & Wong, 2021). It challenges stereotypes about older people as primarily consumers of resources rather than contributors, highlighting the substantial economic and social contributions that older people make through formal employment, volunteer work, family caregiving, and civic participation.

Magnavita (2017) and Mathews (2024) identify several key components of productive ageing, including continued labour force participation through flexible work arrangements, phased retirement, and age-friendly employment practices; volunteer engagement through formal organisations and informal community support; family caregiving, particularly care for grandchildren and spouses; and civic participation through political engagement, advocacy, and community leadership. The productive ageing framework encompasses stock and flow dynamics, including human and social

capital of older adults, family resources, organisational capacity, programmes and policies supporting productive engagement, and societal attitudes and expectations about older adults. A systems perspective recognises that productive ageing depends not only on individual motivation and capacity but also on structural opportunities and support.

The framework has been influential in policy development, supporting initiatives such as age discrimination legislation, lifelong learning programmes, and incentives for continued workforce participation. However, critics have noted that the emphasis on productivity may create new forms of pressure and exclusion for those who cannot or choose not to maintain high levels of activity and contribution. Contemporary approaches to productive ageing increasingly emphasise choice and flexibility, recognising that people may want to contribute in different ways at different life stages. This includes supporting diverse pathways to productive engagement and addressing barriers that may prevent older people from contributing according to their interests and capabilities.

2.9 Resilient Ageing

Resilient ageing focuses on the capacity to adapt successfully to the challenges, stresses, and adversities commonly associated with later life. Resilient ageing is defined as a process through which an older person endures beyond physical, psychosocial, or cognitive adversity, through protective factors that influence coping, hardiness, and self-concept in the pursuit of quality of life (Aprahamian et al., 2022). The resilience framework recognises that ageing inevitably involves facing various challenges, including health changes, loss of loved ones, changes in social roles, and potential economic insecurity (Kim et al., 2021). Rather than viewing these challenges as necessarily leading to negative outcomes, the resilience framework emphasises the human capacity to adapt, cope, and even grow through difficult experiences.

Resilience in ageing encompasses multiple levels of developmental functioning: pathological, normal, and optimal (Trică et al., 2024). Resilience focuses primarily on the maintenance and recovery of normal developmental functioning, whilst reserve capacity serves the attainment of further growth and optimal levels of functioning. Research has

identified multiple factors that contribute to resilience in later life. These include individual factors such as optimism, self-efficacy, emotional regulation skills, and meaning-making capacity; social factors such as strong relationships, social support, and community connection; and environmental factors such as access to resources, services, and opportunities for engagement.

The resilient ageing framework has important implications for intervention development, suggesting that efforts should focus not only on preventing or treating problems but also on building and strengthening protective factors that enhance adaptive capacity. This includes interventions to strengthen social connections, develop coping skills, enhance sense of purpose, and improve access to resources and support (Trică et al., 2024). Contemporary research on resilient ageing increasingly recognises that resilience is not simply an individual characteristic but emerges from the interaction between individual capacities and environmental supports. This perspective emphasises the importance of creating resilience supporting environments and communities that can help older people adapt successfully to challenges and maintain well-being despite adversity.

2.10 Smart Ageing

Smart ageing encompasses an emerging framework that emphasises the role of technology, innovation, and intelligent systems in supporting optimal ageing outcomes (Kiss, Reyes, & Hutson, 2024). This approach recognises the potential of digital technologies, artificial intelligence, sensors, and other innovations to address challenges associated with population ageing whilst enhancing quality of life and independence for older people (Labour et al., 2021). The smart ageing framework encompasses several key domains, including smart health systems that use technology to monitor health status, manage chronic conditions, and provide personalised interventions; smart homes and environments that use sensors and automated systems to support safety, comfort, and independence; smart mobility solutions that help older people navigate transportation challenges; and smart social connections that use technology to reduce isolation and enhance social participation.

Central to smart ageing is the concept of ambient assisted living, which involves the integration of various technologies into living environments to provide unobtrusive support for daily activities, health monitoring, and emergency response (Bernal et al., 2024). This includes systems for medication management, fall detection, cognitive support, and remote health monitoring that can help older people maintain independence whilst providing reassurance to family members and healthcare providers. The smart ageing framework also emphasises the importance of digital inclusion, ensuring that older people have access to, and the skills required to use, the relevant technologies (Oladinrin et al., 2023). This includes addressing barriers such as affordability, complexity, privacy concerns, and lack of digital literacy that may prevent older people from benefiting from technological innovations. However, the smart ageing framework also raises important questions about privacy, autonomy, and the potential for technology to replace human contact and caregiving. Critics have noted that technological solutions should complement rather than replace human relationships and support, and that the development of smart ageing technologies should involve older people as partners rather than passive recipients.

2.11 Successful Ageing

Successful ageing reflects one of the most influential and debated frameworks in gerontology. The term ‘successful ageing’ is the most widely used among theoretical models, reflecting its dominant position in ageing research and policy (Waddell et al., 2025). The original Rowe and Kahn model (1997) conceptualised successful ageing as comprising three main components: low probability of disease and disease-related disability, high cognitive and physical functional capacity, and active engagement with life. The framework emerged from research demonstrating that ageing is not inevitably associated with decline and that many people maintain high levels of functioning and engagement throughout later life.

Successful ageing has been further conceptualised by Urtamo et al. (2019), and the model has been widely adopted but also extensively critiqued for its potentially exclusionary implications. Subsequent developments have proposed enhanced models that recognise successful ageing as multifaceted, consisting of interdependent

biological, psychological, social, and spiritual processes, and including both objective and subjective components. According to Rodriguez et al. (2023), contemporary approaches to successful ageing increasingly recognise the importance of subjective evaluations and personal definitions of success. Some models define it as having both objective components (few chronic diseases, ample functional ability, little pain) and subjective components representing individuals' own evaluations of their ageing experience.

Waddell et al. (2025) point out that the recent theoretical developments have emphasised successful ageing as based on three essential foundational elements: functional status, spirituality, and gerotranscendence, with successful ageing defined as an individual's perception of a favourable outcome in adapting to cumulative physiologic and functional alterations whilst experiencing spiritual connectedness and a sense of meaning and purpose in life. The successful ageing framework has been instrumental in shifting the focus from disease and decline to the potential for positive outcomes in later life. However, ongoing debates centre on questions of definition, measurement, and the risk of creating new forms of ageism through normative expectations about how people should age.

2.12 Sustainable Ageing

Sustainable ageing embodies an emerging framework that explicitly connects individual ageing experiences with broader environmental and societal sustainability concerns. According to Nilsson, Bülow, & Kazemi (2015), this approach recognises that population ageing occurs within the context of environmental challenges, resource constraints, and the need for sustainable development that meets present needs without compromising the ability of future generations to meet their own needs. Han et al. (2021) identified several key dimensions of sustainable ageing including environmental sustainability in how ageing populations live, consume, and use resources; economic sustainability in how societies support ageing populations whilst maintaining economic viability; social sustainability in ensuring that ageing occurs within supportive communities and intergenerational solidarity; and cultural sustainability in maintaining and adapting cultural traditions and knowledge across generations. Central to

sustainable ageing is the recognition that current patterns of consumption and resource use may not be viable as populations age and live longer. Such considerations encompass housing, transportation, healthcare resource utilisation, and consumption behaviours that require adaptation to ensure long-term viability. The framework emphasises the need for innovative approaches that can meet the needs of ageing populations whilst reducing environmental impact (Han et al., 2021).

Sustainable ageing also acknowledges the potential contributions that older people can make to sustainability efforts through their knowledge, experience, and often more environmentally conscious behaviours (Komp-Leukkunen & Sarasma, 2023). Examples include transferring traditional ecological wisdom, advocating for environmental protection, and demonstrating sustainable lifestyles. The approach has significant implications for policy development, requiring integration of ageing and sustainability concerns across multiple sectors. Such integration encompasses urban planning that supports both age-friendly and environmentally sustainable communities, transportation networks that meet mobility needs whilst reducing emissions, and healthcare delivery that can address growing demands whilst controlling costs and environmental impact.

2.13 Innovation in Ageing

Innovation in ageing constitutes a dynamic approach that emphasises creativity, adaptation, and novel solutions to address the challenges and opportunities associated with population ageing (Sands, Albert & Sutor, 2017). This framework recognises that traditional approaches may be insufficient to address the scale and complexity of demographic change and that new ideas, technologies, and models are needed to support optimal ageing outcomes. The innovation framework encompasses technological innovations, including digital health technologies, robotics, artificial intelligence, and biotechnology that can support health, independence, and quality of life; social innovations including new models of care, community engagement, and intergenerational programming; policy innovations including new approaches to retirement, healthcare financing, and age-friendly development; and business

innovations including new products, services, and market approaches that serve ageing populations (Klimczuk & Tomczyk, 2020).

Central to innovation in ageing is the concept of co-design and participatory innovation, ensuring that older people are involved as partners in identifying challenges, developing solutions, and evaluating outcomes (van Hees et al., 2023). Such an approach recognises that older people are experts in their own experiences and that effective innovations must be responsive to actual needs and preferences rather than assumptions about what older people require (Klimczuk & Tomczyk, 2020). The innovation framework also emphasises the importance of scaling and sustainability, ensuring that promising innovations can be adapted and implemented across different contexts and maintained over time.

Successful implementation requires attention to business models, policy frameworks, and implementation strategies that can support widespread adoption of effective innovations. Innovation in ageing increasingly recognises the need for systemic change rather than simply technological fixes. Such transformations include innovations in how services are organised and delivered, how communities are designed and developed, and how societies think about and respond to ageing. The framework emphasises that successful innovation requires collaboration across sectors and disciplines, bringing together diverse perspectives and expertise. Table 2.1 provides a consolidated overview of all thirteen conceptual frameworks examined in Sections 2.1 through 2.13, identifying their core focus, key references, and paradigmatic domain.

Table 2.1: Overview of Ageing Conceptual Frameworks

Section	Framework	Key References	Core Focus	Paradigm Domain (Section 2.14)
2.1	Active Ageing	Paúl et al., 2012 Barber et al., 2024	Optimising health, participation, and security	Society-Centred
2.2	Age-Friendly Ageing	WHO, 2018; van Hoof et al., 2021	Creating supportive physical and social environments	Society-Centred
2.3	Dignified Ageing	Clancy et al., 2021; Seedsman, 2019	Preserving autonomy, respect, and human rights	Cultural-Spiritual
2.4	Harmonious Ageing	Liang & Luo, 2012; Lomas, 2021	Achieving balance across life domains	Cultural-Spiritual

2.5	Healthy Ageing	Menassa et al., 2023; Rudnicka et al., 2020	Maintaining functional ability and well-being	Individual-Centred
2.6	Integrated Ageing	Amelung et al., 2021; WHO, 2019	Coordinating services and policies across sectors	Systems Integration
2.7	Positive Ageing	Bar Tur, 2021; Crăciun, 2023	Emphasising strengths, resilience, and growth	Individual-Centred
2.8	Productive Ageing	Morrow-Howell & Sun, 2022; Mathews, 2024	Valuing continued contribution to society	Society-Centred
2.9	Resilient Ageing	Aprahamian et al., 2022; Tričá et al., 2024	Adapting successfully to adversity and loss	Individual-Centred
2.10	Smart Ageing	Kiss et al., 2024.; Bernal et al., 2024	Leveraging technology for independence and quality of life	Systems Integration
2.11	Successful Ageing	Urtamo et al., 2019; Waddell et al., 2025	Achieving optimal functioning across domains	Individual-Centred
2.12	Sustainable Ageing	Nilsson et al., 2015; Han et al., 2021	Connecting individual ageing with societal sustainability	Systems Integration
2.13	Innovation in Ageing	Klimczuk & Tomczyk, 2020; van Hees et al., 2023	Developing creative solutions to ageing challenges	Systems Integration

Source: Compiled by the authors. Colour coding corresponds to paradigmatic domains in Section 2.14: blue = Individual-Centred; green = Society-Centred; orange = Cultural-Spiritual; purple = Systems Integration.

2.14 Integrated Model of Ageing Paradigms and Conceptual Frameworks

The field of ageing research has evolved significantly over recent decades, producing diverse conceptual frameworks that each illuminate different dimensions of the ageing experience. This synthesis presents an Integrated Model of Ageing Paradigms and Conceptual Frameworks that addresses the fundamental challenge identified in contemporary literature: the absence of a unified definition of ageing due to its inherent complexity and multidimensional nature. The model organises existing frameworks into four interconnected paradigmatic domains – Individual-Centred, Society-Centred, Cultural-Spiritual, and Systems Integration – that converge into a central integrative framework, providing a comprehensive foundation for understanding ageing as a dynamic, multifaceted process.

The heterogeneity in ageing conceptualisations reflects both the richness of the field and the practical challenges faced by researchers, practitioners, and policymakers seeking coherent guidance. As Table 2.2 illustrates, no single framework adequately

addresses all dimensions of the ageing experience, confirming the need for an integrative approach. As Gaviano et al. (2024a) concluded, there is no common, universally accepted definition of ageing due to the complexity of the phenomenon. This underscores the need for an integrative approach that can harmonise diverse theoretical perspectives while maintaining their unique contributions.

Table 2.2: Recurring Themes Across Ageing Frameworks

Theme	Description	Most Prominent In
Person–Environment Interaction	Ageing outcomes emerge from the dynamic fit between individual capacities and environmental demands	Age-Friendly, Harmonious, Integrated, Sustainable Ageing
Agency and Empowerment	Older adults are active agents in shaping their own ageing trajectories, not passive recipients	Active, Productive, Positive, Resilient Ageing; Innovation in Ageing
Life-Course Perspective	Health and well-being in later life are shaped by cumulative experiences across the entire lifespan	Healthy, Successful, Sustainable Ageing
Multidimensionality	Ageing encompasses biological, psychological, social, cultural, economic, and environmental dimensions simultaneously	All frameworks, to varying degrees
Prevention Over Cure	Promoting well-being and functional capacity is more effective than treating deficits after onset	Healthy, Active, Resilient Ageing
Social Connectedness	Relationships, participation, and community belonging are protective factors against decline	Active, Age-Friendly, Positive, Productive Ageing
Dignity and Rights	All people deserve respect, autonomy, and recognition of worth regardless of age or capacity	Dignified, Age-Friendly, Harmonious Ageing
Innovation and Adaptation	New technologies, models, and approaches are needed to address unprecedented demographic challenges	Smart, Integrated, Sustainable Innovation in Ageing

Source: Compiled by the authors based on Sections 2.1–2.13.

This integrated model emerged from comprehensive analyses of ageing literature, including systematic reviews by Gaviano et al. (2024) examining 50 studies across diverse geographical contexts, and by Menassa et al. (2023), analysing 65 models and definitions from 16 countries. These analyses reveal that while individual frameworks offer valuable insights, no single model adequately captures the full complexity of contemporary ageing challenges. This synthesis approach aligns with the contemporary recognition that ageing occurs within dynamic person-environment

interactions and involves continuous adaptation processes across cognitive, physical, psychological, social, environmental, cultural, economic, and spiritual dimensions.

2.14.1 Theoretical Foundation and Development

The integrative approach draws upon the foundational understanding that ageing represents a complex phenomenon encompassing both positive and negative aspects, and it constitutes an advanced phase of the life course (Andrews & Read, 2024). This perspective aligns with the multidimensional approach to successful ageing, which offers a more informative perspective than focusing on single health outcomes, such as chronic diseases or functioning (Urtamo et al., 2019). The model emerges from the recognition that ageing research has evolved significantly from early biomedical approaches to more comprehensive biopsychosocial perspectives. As several studies demonstrate through their systematic reviews, the field has witnessed significant evolution in how successful ageing is conceptualised, moving from narrow biomedical criteria focused on disease absence to broader frameworks that encompass psychological, social, and environmental dimensions (Gaviano et al., 2024; van Hoof et al., 2021; Zamudio Rodríguez et al., 2021). This evolution reflects the growing awareness that ageing is a complex and multifactorial phenomenon that manifests differently at each stage of life.

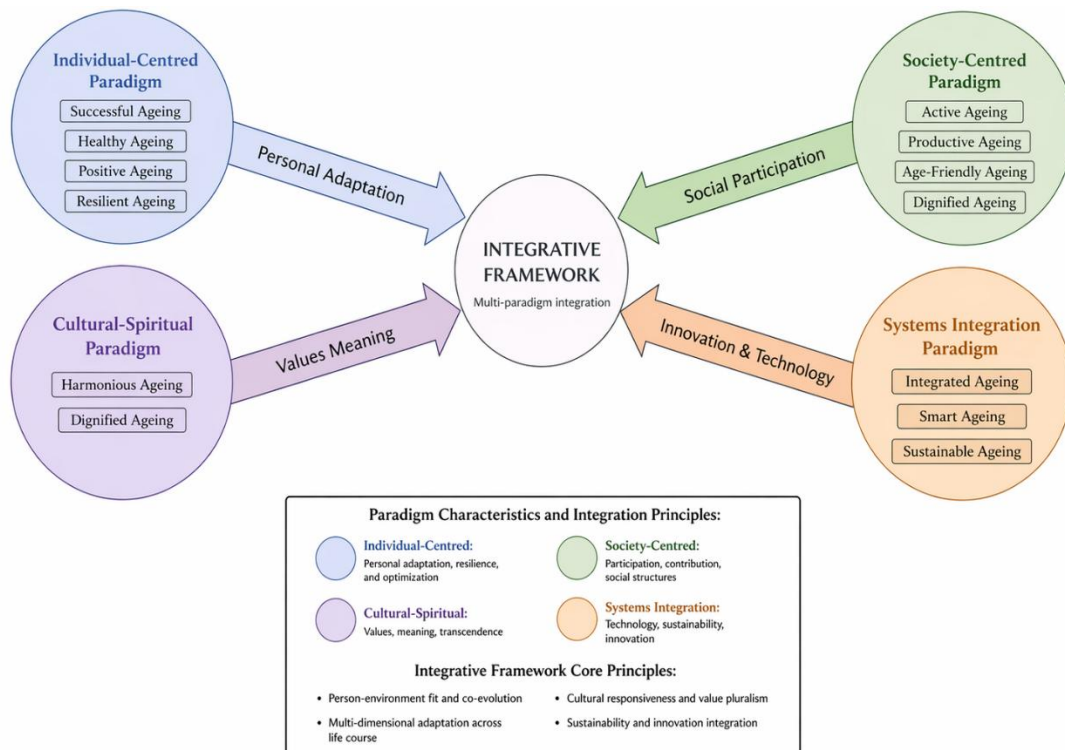
The framework acknowledges the evolution from biomedical approaches to more holistic perspectives, as the definition of successful ageing has shifted from a biomedical to a more holistic view, emphasising more subjective aspects of the ageing process (Urtamo et al., 2019). Furthermore, it recognises that ageing research should embrace interdisciplinary approaches and continue exploring new horizons to meet the diverse needs of individuals facing ageing and those yet to experience it (Gaviano et al., 2024). The integrative nature of this framework reflects the understanding that ageing is a distributed process of practices, requiring consideration of both human and non-human entities in their co-ageing relationships (Andrews & Read, 2024). This multi-paradigm integration acknowledges that successful ageing interventions must address the complexity and multidimensionality inherent in the ageing process, moving beyond

traditional siloed approaches to embrace the interconnected nature of biological, psychological, social, and environmental factors.

2.14.2 Central Integrative Framework

At the heart of the model lies the **Integrative Ageing Framework** (see Figure 2.2), which serves as the unifying conceptual hub synthesising insights from all four paradigmatic domains. This central framework embodies multi-paradigm integration, recognising that optimal ageing outcomes emerge from dynamic interactions between individual capacities, social structures, technological innovations, and cultural-spiritual dimensions. The integrative approach acknowledges the finding by Gaviano et al. (2024) that contemporary challenges require responses that embrace interdisciplinary approaches and continue exploring new horizons to meet the diverse needs of individuals in later life.

Figure 2.2: Integrated Model of Ageing Paradigms and Conceptual Frameworks



Source: Authors' elaboration, 2026.

2.14.3 Four Paradigmatic Domains

2.14.3.1 *Individual-Centred Paradigm*

The **Individual-Centred Paradigm** encompasses frameworks prioritising personal adaptation, resilience, and optimisation processes. This paradigm includes **Successful Ageing**, which Gaviano et al. (2024) identify as the most used and discussed concept, originally proposed by Havighurst (1961) and later refined by Rowe and Kahn (1987, 1997). The paradigm also incorporates **Healthy Ageing**, focusing on functional ability and well-being; **Positive Ageing**, drawing from positive psychology to emphasise strengths and growth potential; and **Resilient Ageing**, highlighting adaptive capacity in adversity.

These frameworks share emphasis on individual agency and adaptation processes. As Gaviano et al. (2024) note, determinants within this paradigm encompass the foundational elements that significantly impact the ageing trajectory, including genetic predispositions, cognitive frameworks, life experiences, and psychosocial influences. Gautam et al. (2024) note that the paradigm recognises that mental resilience, fundamental cognitive abilities, and effective stress management are recognised as psychological determinants that intricately influence the perception and experience of ageing.

2.14.3.2 *Society-Centred Paradigm*

The **Society-Centred Paradigm** emphasises participation, contribution, and social structures supporting optimal ageing. **Active Ageing**, as defined by the WHO (2002), demonstrates a process of optimising opportunities for health, participation, and security to improve the quality of life for ageing individuals. **Productive Ageing** focuses on older adults' continued capacity to contribute through work, volunteering, and caregiving, while **Age-Friendly Ageing** emphasises creating supportive environments enabling participation and independence.

Holt-Lunstad (2024) and Luo et al. (2020) highlight that social engagement emerges as a critical factor, noting that social engagement is as strong a protective factor for health as many other established risk factors. The paradigm recognises that the association between social engagement, health and well-being has been well

documented throughout the lifespan, emphasising that community engagement provides older adults with a sense of purpose and a role in the community.

2.14.3.3 *Cultural-Spiritual Paradigm*

The **Cultural-Spiritual Paradigm** addresses values, meaning-making, and transcendence in the ageing process. **Harmonious Ageing** emphasises balance and person-environment fit, while **Dignified Ageing** centres on respect, autonomy, and recognition of inherent human worth. This paradigm acknowledges Gaviano et al.'s (2024) finding that cultural influences shape the understanding and interpretation of ageing across different societies and communities.

The research by Papadopoulos (2020) and McManus (2024) highlights the importance of spirituality or religion in the concept of successful ageing as a protection factor in the ageing process and in maintaining a healthy lifestyle. In addition, Gaviano et al. (2024) note that spirituality is associated with improved well-being, reduced depression, morbidity, and increased longevity among older adults, with many elders explicitly recognising spirituality's positive effects on their health.

2.14.3.4 *Systems Integration Paradigm*

The **Systems Integration Paradigm** focuses on technology, sustainability, coordination, and systemic approaches to ageing challenges. **Integrated Ageing** emphasises coordination across services, policies, and sectors; **Smart Ageing** leverages technology and innovation to support independence and quality of life; **Sustainable Ageing** connects individual ageing with environmental and societal sustainability concerns; and **Innovation in Ageing** promotes creative, adaptive solutions to emerging challenges.

This paradigm acknowledges the contemporary context where ageing occurs within complex technological and environmental systems requiring coordinated, innovative responses to address what Kumar et al. (2023) and van Hoof et al. (2021) identify as one of the most significant challenges of our time.

2.15 Interconnections and Synergies

The integrative model of ageing paradigms delineates four principal pathways: (1) Personal Adaptation, (2) Social Participation, (3) Values & Meaning, and (4) Innovation & Technology. Each represents a critical interface between paradigmatic domains and the central framework for healthy ageing, reflecting the multidimensional, dynamic, and context-sensitive nature of ageing, as emphasised in both theoretical syntheses and empirical studies.

2.15.1 Personal Adaptation

This pathway links the Individual-Centred Paradigm to the central framework by emphasising psychological resilience, self-regulation, and adaptive capacity. Gaviano et al. (2024) identify adaptation processes such as psychological resilience and the capacity to adjust to novel circumstances as integral to successful ageing. This aligns with Menassa et al. (2023), who highlight adaptive processes such as selection, optimisation, and compensation as core attributes of healthy ageing models. Similarly, Urtamo et al. (2019) and Zamudio Rodríguez et al. (2021) highlight that individuals can age successfully even in the presence of chronic conditions, provided they employ effective psychological and social coping mechanisms.

2.15.2 Social Participation

Connecting the Society-Centred Paradigm, this pathway underscores the role of social engagement, community involvement, and interpersonal relationships in promoting well-being. Gaviano et al. (2024) describe social engagement as encompassing emotional and social connections with family, friends, and the community. This is supported by findings from Zamudio Rodríguez et al. (2021), who note that social participation is a consistent determinant of subjective well-being. Urtamo et al. (2019) further emphasise that older adults themselves often define successful ageing in terms of maintaining social roles and avoiding loneliness.

2.15.3 Values & Meaning

This pathway bridges the Cultural-Spiritual Paradigm with the central framework, reflecting the significance of existential dimensions such as purpose, spirituality, and

cultural identity. Gaviano et al. (2024) underscore that emotional well-being in elders involves resilience, adaptability, and acceptance of the ageing process. Menassa et al. (2023) similarly identify spiritual and cultural dimensions as essential to emotional well-being, particularly in fostering meaning and coherence. Urtamo et al. (2019) also highlight the importance of self-acceptance, life satisfaction, and a sense of purpose as central to lay definitions of ageing well.

2.15.4 Innovation & Technology

Aligned with the Systems Integration Paradigm, this pathway acknowledges the transformative role of technological and systemic innovations in supporting ageing populations. Gaviano et al. (2024) recognise the role of innovation in addressing contemporary ageing challenges. Menassa et al. (2023) expand on this by noting that health promotion and empowerment – often facilitated by digital tools, assistive technologies, and integrated care systems – are central to enhancing resilience and functional capacity. These innovations not only support physical and cognitive health but also enable greater social inclusion and environmental adaptability.

2.16 Conclusion

The Integrated Model of Ageing Paradigms and Conceptual Frameworks offers a structured yet flexible approach to understanding ageing as a complex, multidimensional process. Rather than prescribing a single definition, it organises diverse approaches into coherent domains, highlighting shared themes such as person-environment interaction, adaptation, and the influence of social and ecological contexts. This approach allows for conceptual clarity while accommodating the varied experiences and values of ageing across different populations. It also acknowledges that ageing is not solely a biological or individual process, but one that is deeply embedded in cultural, environmental, and societal systems.

By synthesising these perspectives, the model supports the development of inclusive, context-sensitive strategies for promoting well-being in later life. It encourages the integration of diverse insights while avoiding the oversimplification of ageing's inherent complexity. The model reflects a growing recognition of the need to address inequalities and support marginalised groups, whose experiences of ageing may differ

significantly. As global challenges like climate change, technological change, and social fragmentation evolve, this integrative approach provides a foundation for responsive, sustainable, and equitable ageing policies and practices. Ultimately, it equips researchers, practitioners, and policymakers with a comprehensive lens to design interventions that are both theoretically grounded and practically effective.

The practical value of the integrated model extends beyond conceptual clarity to its utility as a diagnostic framework for identifying gaps in existing ageing policies and programmes. When a proposed intervention is mapped against the four paradigmatic domains, the domains left unaddressed become visible in a way that single-discipline evaluation cannot reveal. A pension reform that addresses the Society-Centred and Systems Integration paradigms through extended labour market participation incentives but neglects the Individual-Centred domain by failing to address the health conditions that limit many workers' capacity to remain in the workforce, will systematically underperform its projections. A digital inclusion programme that addresses the Systems Integration paradigm through technology provision but neglects the Cultural-Spiritual domain by designing interfaces without reference to the values, aesthetics, and meaning-making frameworks of older users will achieve lower adoption than its developers anticipate. The integrated model thus functions not only as a theoretical synthesis but as a practical audit tool, enabling policymakers, programme designers, and researchers to identify the paradigmatic blind spots in their current approaches and design more comprehensive responses. This diagnostic function may prove to be among the model's most durable contributions to the field of ageing studies, as it provides a structured method for the kind of critical interdisciplinary self-examination that Chapter 8 identifies as essential for genuine progress toward sustainable ageing.

3 Health Systems and Preventive Strategies in the Context of Sustainable Ageing

The health systems and preventive strategies examined in Chapter 3 operate within social structures that profoundly shape how older adults experience ageing, access services, and maintain autonomy. The chapter demonstrates that sustainable ageing requires not merely adequate service provision but fundamental transformation of the power relations, institutional designs, and systemic structures that currently create dependency rather than enabling agency among older populations.

3.1 Epidemiological Transition and Demographic Changes

Commonwealth countries are experiencing a profound demographic shift characterised by population ageing (The Commonwealth, 2024). Currently, 60% of its 2.7 billion people are under the age of 30; however, projections indicate that a dramatic transformation is underway. By 2050, the number of individuals aged 65 and over in Commonwealth countries is expected to rise from 231 million in 2019 to 559 million, an increase of over 142% (UN DESA, 2019a). This transition reflects declining fertility rates and increased life expectancy, with many Commonwealth nations seeing a 50% increase in life expectancy since the 1970s.

This epidemiological transition is particularly evident in low- and middle-income countries (LMICs), where it presents unprecedented challenges. Unlike high-income nations that have aged gradually over decades, many developing Commonwealth countries are experiencing compressed ageing timelines, necessitating more rapid policy adaptations. The shift in disease burden from acute infectious diseases to chronic non-communicable conditions requires fundamental changes in public health approaches. Conditions such as cardiovascular diseases, diabetes, dementia, and other age-related disorders now dominate healthcare needs, particularly in ageing populations. The working-age population in at least ten Commonwealth countries – including Barbados, Jamaica, Malta, and Singapore – is projected to decline between now and 2040, creating potential labour shortages in critical sectors while simultaneously increasing dependency ratios. These demographic realities require

comprehensive public health strategies that address both immediate healthcare needs and longer-term workforce planning.

The European context illustrates these demographic pressures with clarity. Within Central Europe, countries that experienced rapid socioeconomic transformation following the post-1989 transition are now confronting compressed ageing timelines comparable to those observed in developing Commonwealth nations. In Slovakia, for instance, the ageing index reached 107% by 2020, meaning that for every 100 children there were 107 inhabitants aged 65 and over. Life expectancy at birth has risen steadily, reaching 74.3 years for men and 80.8 years for women, yet this longevity gain has been accompanied by a corresponding increase in the prevalence of chronic conditions that dominate morbidity in later life. The leading causes of death in 2019 were neoplasms (33.8%), cardiovascular diseases (31.8%), digestive system diseases (8.8%), injuries (7.9%), and respiratory diseases (5.5%) – a profile characteristic of advanced epidemiological transition (Ministry of Finance of the Slovak Republic, Ministry of Health of the Slovak Republic, 2019). These patterns are broadly representative of the Visegrád Four countries and much of post-socialist Central Europe, where population ageing is proceeding against a backdrop of historically lower healthcare investment and weaker preventive infrastructure than in Western European comparators.

A further complication arises from the persistence of communicable disease threats alongside the rising burden of chronic non-communicable conditions. While cardiovascular diseases, cancers, and metabolic disorders dominate mortality statistics in ageing European populations, infectious diseases remain a significant public health concern. The COVID-19 pandemic caused by the SARS-CoV-2 virus exposed the particular vulnerability of older adults to novel pathogens, while the emergence of drug resistant strains of tuberculosis, the continued spread of HIV/AIDS in several countries, and recurring influenza epidemics underscore the ongoing need for robust surveillance and response capacity. For ageing populations with declining immune function, this ‘double burden’ of communicable and non-communicable disease creates compounding vulnerabilities that public health systems must address simultaneously (Khan et al., 2024).

The scale of avoidable mortality across developed countries further underlines the urgency of prevention-oriented approaches. In 2019, OECD countries collectively reported more than three million premature deaths among individuals under 75 years of age that were potentially avoidable through effective public health measures and healthcare interventions. Of these, approximately 63% were classified as preventable deaths – deaths that could have been averted through effective primary prevention and other public health interventions. The principal categories of preventable mortality included selected cancers, particularly lung cancer (31%); accidents and suicides (21%); cardiovascular events, including myocardial infarction and stroke (19%); alcohol-related and substance-related deaths (14%); and respiratory conditions, including influenza and chronic obstructive pulmonary disease (8%). These figures represent not only human suffering but also substantial economic costs in lost productivity and healthcare expenditure that could be mitigated through more effective preventive strategies (OECD, 2021).

3.2 Prevention and Health Promotion in Ageing Populations

A conceptual understanding of prevention requires distinguishing between its successive levels, each targeting a different stage in the progression from health to disease. Primary prevention encompasses measures aimed at averting the onset of disease by reducing exposure to risk factors. Examples include vaccination programmes, health education campaigns promoting physical activity and balanced nutrition, and legislative measures restricting tobacco and alcohol consumption. The objective of primary prevention is to reduce the incidence of new cases and to anticipate the occurrence and severity of disease before it develops (Keyes, Turfe & Das, 2023). Secondary prevention, by contrast, targets conditions that have already developed but remain in early or latent stages. Its aim is to detect disease as early as possible and to prevent its progression through screening programmes, early diagnostic interventions, and targeted lifestyle modifications. Screening for cancers, diabetes, and cardiovascular risk markers represents the core of secondary prevention in ageing populations. Tertiary prevention focuses on minimising the negative impact of established disease through rehabilitation, prevention of complications, and maintenance of functional capacity. In the context of ageing, tertiary prevention includes post-surgical rehabilitation, chronic

disease management programmes, and interventions aimed at preserving independence and quality of life (Sukenova et al., 2026).

This tripartite framework is essential for understanding how public health investment can be strategically targeted across the life course. Primary and secondary prevention are of particular significance for sustainable ageing, as they address the modifiable determinants of health before the onset of costly chronic conditions. Preventive activities are embedded in clinical care, population-level public health programmes, and individual health behaviours; according to several models of health determinants, prevention through lifestyle modification alone may influence up to 40% of individual health outcomes (Hegyi & Bielik, 2011). When combined with the broader impact of socioeconomic and environmental determinants, the proportion of health outcomes amenable to preventive intervention rises to 60–70%, far exceeding the contribution of curative healthcare (OECD, 2019). This underscores the strategic importance of investing in prevention as a foundation for sustainable ageing.

Prevention and health promotion constitute fundamental pillars for addressing the challenges of ageing populations across the Commonwealth. A life course approach, as implemented in Malta's National Healthy Weight for Life strategy, demonstrates how integrative health promotion can span multiple life stages and domains. Such frameworks recognise that the foundation for healthy ageing begins early in life, with investments in education, nutrition, and preventive healthcare yielding dividends in later years.

Evidence suggests that implementing targeted prevention programmes can significantly reduce the burden of non-communicable diseases (NCDs). These programmes should focus on modifiable risk factors, including nutrition, physical activity, tobacco avoidance, and alcohol moderation. The Commonwealth's approaches must emphasise that many age-related conditions, including up to 40% of dementia cases, are potentially preventable through lifestyle modifications and early interventions (Livingston et al., 2020).

Digital health technologies offer promising avenues for prevention and health promotion. Bangladesh's Elderly Care Technology Programme exemplifies how mobile

and digital technologies can enhance healthcare access through telehealth services while promoting digital literacy among seniors. These innovations can extend the reach of preventive services to underserved populations, including those in rural and remote areas where healthcare infrastructure may be limited. Intergenerational interventions, such as Australia's Intergenerational Learning Programme (2023), represent another effective prevention strategy. These programmes not only improve health outcomes for older adults but also foster knowledge transfer between generations, creating sustainable community support systems that enhance overall population health.

The importance of adequate investment in preventive care is particularly evident in Central European countries. Slovakia represents a striking case of chronic underinvestment in this domain: in 2019, the country allocated merely 0.8% of total healthcare expenditure to preventive care, compared to a European average of 2.6% (Eurostat, 2023). This underinvestment has measurable consequences for population health outcomes. According to OECD data, Slovakia recorded 189 cases of preventable mortality per 100,000 inhabitants in 2019, with cardiovascular, oncological and pulmonary diseases representing the primary causes (Ministry of Finance of the Slovak Republic, Ministry of Health of the Slovak Republic, 2019). Within the Visegrád Four countries, both Poland and the Czech Republic achieved better preventable mortality outcomes despite comparable or lower overall healthcare expenditure as a share of GDP, suggesting that the allocation rather than the volume of healthcare spending is a critical determinant of population health outcomes (OECD/European Observatory on Health Systems and Policies, 2021).

Research on optimal prevention spending further underscores the scale of this challenge. Wang & Wang (2021) estimated the optimal level of preventive expenditure at 1.175% of gross national product, while Slovakia allocated approximately 0.05% of GDP to preventive care in 2019 – representing a gap of more than twentyfold relative to the evidence-based optimum. Behavioural risk factors compound this challenge significantly: data from the Institute for Health Metrics and Evaluation indicate that more than 35% of the total disease burden in Slovakia in 2015, measured in disability-adjusted life years, was attributable to behavioural risk factors including smoking, alcohol consumption, physical inactivity, and poor dietary habits (IHME, 2016). The

significance of behavioural risk factors must be understood within the broader architecture of health determinants. Research has identified several complementary models that estimate the relative contributions of different determinants to population health outcomes. One influential framework attributes approximately 20% of health outcomes to genetic factors, 10% to healthcare access and quality, 30% to environmental conditions, and 40% to individual lifestyle and behavioural choices (Hegyi & Bielik, 2011). An alternative model, which does not include non-modifiable genetic factors, assigns approximately 40% to socioeconomic conditions, 30% to individual health behaviour, 20% to healthcare, and 10% to environmental factors (OECD, 2019). Both models converge on a fundamental conclusion: the factors most amenable to public health intervention – lifestyle behaviours, socioeconomic conditions, and environmental exposures – collectively account for the overwhelming majority of health outcomes, while the contribution of curative healthcare, though important, is comparatively modest. For ageing populations, this implies that decades of cumulative exposure to behavioural and environmental risk factors substantially determine late life morbidity patterns, and that the most effective investments in healthy ageing are those directed at modifying these upstream determinants well before the onset of chronic disease. The health determinants operating from the individual level upward include tobacco use, high blood pressure, excessive alcohol consumption, elevated cholesterol, being overweight, insufficient consumption of fruits and vegetables, level of physical inactivity, and substance use. Structural determinants operating at the societal level encompass neoliberal trade policies, income inequalities, poverty, occupational health risks, and low levels of social cohesion (Dahlgren & Whitehead, 2007). The interaction between these individual and structural determinants creates the conditions in which ageing populations either thrive or experience accelerated decline.

3.3 Healthcare System Adaptation Needs

Primary and specialised healthcare and social supportive systems face mounting pressures to adapt to the complex needs of ageing populations. The projected 4.2% annual increase in global healthcare spending through 2030 is driven primarily by the needs of older populations (Hanson et al., 2022), necessitating significant structural adaptations to healthcare delivery models.

Primary healthcare systems require strengthening to manage chronic conditions effectively. This includes developing integrated care pathways that coordinate services across multiple providers and settings. According to Khatri et al. (2023), healthcare coordination for older adults necessitates a multilevel approach that addresses the complex and evolving needs across the life course. Continuity of care is particularly critical for elderly populations who frequently present with multiple chronic conditions requiring coordinated interventions from various healthcare providers and settings. Evidence indicates that older adults with high continuity of care demonstrate greater improvements in functional roles, including physical, general, emotional, and mental health dimensions. Effective care coordination for ageing populations requires not only interprofessional collaboration among healthcare providers but also integration of community supports and social services to facilitate comprehensive person-centred care. Workforce development reflects another critical adaptation need. Many Commonwealth countries face shortages of healthcare professionals trained in geriatric care. Expanding training programmes for care providers and health professionals, as outlined in the Commonwealth Ageing Well Roadmap (2024), is essential for improving the quality of geriatric care. This includes developing certification pathways for specialised workers and implementing governance structures to ensure quality standards in long-term care settings.

Financial sustainability presents perhaps the greatest adaptation challenge. Without proactive measures, the median country can expect its fiscal imbalance due to age-related spending to rise from 2.4% of GDP in 2025 to 9.1% by 2060 (Tilleray & Mrsnik, 2023). Strategic investments in preventive healthcare, technology integration, and efficiency improvements will be crucial for managing these fiscal pressures while maintaining quality care.

Per capita healthcare expenditure, expressed in purchasing power standards, has increased consistently across all European country groups between 2011 and 2021 (Eurostat, 2023). Countries operating mandatory public health insurance systems, including Slovakia, recorded an average increase of approximately 50% over this period, reflecting both growing healthcare demand driven by demographic ageing and rising system costs associated with technological advancement and expanding treatment

options. These trends are projected to continue in the coming decades as the burden of multimorbidity among older populations intensifies pressure on healthcare budgets across the region (OECD/European Observatory on Health Systems and Policies, 2021).

The structure of preventive expenditure within Slovakia reveals important priorities within the system. Applying the System of Health Accounts 2011 methodology, the majority of reported preventive expenditure falls within the category of information, education and communication, with a smaller proportion allocated to health status monitoring, and minimal resources directed toward immunisation programmes, early disease detection, and epidemiological surveillance (Eurostat, 2023). This structural imbalance suggests that reallocation of existing preventive resources, alongside increases in their overall volume, represents a critical policy lever for improving population health outcomes in an ageing society. Slovakia trails not only Western European comparators but also its Central European neighbours in this regard, despite facing comparable demographic pressures and a rapidly ageing population (OECD/European Observatory on Health Systems and Policies, 2021).

The capacity of healthcare systems to adapt to population ageing is fundamentally shaped by their financing models. Comparative analysis reveals significant variation in how countries structure and fund their health systems, with important consequences for both curative and preventive capacity. Countries with universal, tax financed healthcare systems – including the Nordic countries (Finland, Iceland, Norway, Sweden), several Southern European nations (Italy, Portugal, Malta, Spain), and the United Kingdom – tend to achieve higher health system efficiency scores and more favourable population health outcomes. Within this group, Sweden and Norway consistently rank among the highest performers, with system scores of 83.1 and 82.2 respectively (WHO, 2022). Countries operating mandatory public health insurance systems, including Slovakia, the Czech Republic, Hungary, France, and Germany, exhibit greater variance in outcomes, though several achieve excellent results, with Belgium attaining the highest system score (83.8) within this group. A third category encompasses mixed public private arrangements, as found in Austria, Germany, and several Latin American countries, while a small number of nations rely primarily on

universal private insurance schemes, notably the Netherlands, Switzerland, and Israel. The type of financing model influences not only access to curative care but also the volume and stability of resources directed toward population-level preventive services, which are among the first expenditure categories to face reduction during periods of fiscal pressure (OECD, 2024).

The institutional architecture of public health systems constitutes another critical determinant of adaptive capacity. The core functions of public health institutions can be classified into service-oriented functions and enabling functions. Service-oriented functions encompass health promotion, health protection, disease prevention and early detection, and public health emergency management. These are supported by enabling functions including governance and strategic planning, health financing, workforce development, quality assurance and equity monitoring, participatory governance, and public health intelligence and research (Zhang et al., 2023). The organisational structure through which these functions are delivered varies considerably across European countries, reflecting differences in constitutional arrangements, governance traditions, and historical development paths. Federal states such as Germany, Belgium, and Austria distribute responsibilities between national and regional governments, while unitary states such as Iceland and Luxembourg centralise public health governance. Countries such as France, the Netherlands, and Denmark additionally manage overseas territories with distinct public health needs. Regardless of the specific organisational model, the effectiveness of public health institutions in addressing population ageing depends on stable and predictable financing, adequate workforce capacity, and the integration of preventive services within the broader healthcare delivery system (OECD/European Observatory on Health Systems and Policies, 2018).

Comparative data across European countries reveal that government-financed preventive expenditure provides a more stable and predictable funding base than voluntary private schemes, which tend to fluctuate more significantly with economic cycles. This stability is of particular importance for population-level interventions targeting chronic disease risk factors, where programmatic continuity is essential for achieving measurable outcomes. Statistical analyses of European expenditure data confirm that the volume of government-financed preventive spending is a more

consistent predictor of population health outcomes – including life expectancy at birth and rates of avoidable mortality – than spending from voluntary financing schemes, underscoring the importance of sustained public investment in preventive infrastructure (Evans, Kurowski, & Tediosi, 2023).

The System of Health Accounts 2011 (SHA 2011) methodology provides a standardised framework for classifying and comparing preventive care expenditure across countries (OECD, 2017). Under this classification, preventive expenditure is disaggregated into six functional categories: information, education, and counselling programmes (HC.6.1); immunisation programmes (HC.6.2); early disease detection programmes (HC.6.3); health condition monitoring programmes (HC.6.4); epidemiological surveillance and risk and disease control programmes (HC.6.5); and preparedness for disaster and emergency response programmes (HC.6.6). Analysis of expenditure patterns across European country clusters reveals that nations with higher life expectancy and lower avoidable mortality rates tend to allocate a larger proportion of preventive expenditure to the HC.6.1 category (information, education, and counselling) and HC.6.4 (health status monitoring). By contrast, countries in Central and Eastern Europe, including Slovakia, Estonia, Hungary, Latvia, Lithuania, Poland, Bulgaria, Croatia, and Romania, allocate less than 10% of their preventive expenditure to the HC.6.1 category and report substantially lower absolute spending levels. Given that HC.6.1 activities encompass primary and secondary prevention delivered through mass media campaigns and individual counselling on topics such as smoking cessation, dietary habits, physical activity, alcohol consumption, and participation in immunisation and screening programmes, this structural gap represents a significant missed opportunity. Investment in behavioural modification and health education, aligned with the evidence that lifestyle factors account for approximately 40% of health outcomes, constitutes one of the most strategically efficient uses of preventive resources in ageing societies (Eurostat, 2023; Hegyi & Bielik, 2011).

3.4 Environmental Health Considerations

Environmental factors significantly impact healthy ageing and must be incorporated into comprehensive public health strategies. Climate change poses a

disproportionate threat to older adults, with projections indicating that deaths related to heatwaves among people aged 65 and above will rise dramatically between 2030 and 2050 (WHO, 2015). This vulnerability is particularly acute in Small Island Developing States (SIDS), which include 25 Commonwealth members.

Age-friendly environmental design constitutes a critical intersection between public health and urban planning. The WHO's Age-Friendly Cities framework identifies interconnected domains, including transportation, housing, outdoor spaces, and buildings that can create supportive environments for healthy ageing. Commonwealth initiatives like Manchester's age-friendly housing schemes demonstrate how urban planning can support independent living for older adults through features such as step-free access, wider doors, and proximity to community services. Rural environments present distinct environmental health challenges. Research indicates that older adults in rural areas experience significant disadvantages compared to their urban counterparts (Cohen & Greaney, 2023). Policies fostering age-friendly rural communities or 'smart villages' with supportive infrastructure can address these disparities and ensure older adults can age well regardless of geographic location.

Climate resilience must be integrated into health system planning. The Commonwealth Ageing Well Roadmap recommends prioritising investments in climate-resilient healthcare facilities that can serve ageing populations during extreme weather events. This includes strengthening infrastructure to reduce disruptions in medical services and ensure older people receive timely care during climate-related emergencies.

The workplace environment constitutes a further dimension of environmental health with direct implications for sustainable ageing. Occupational exposure to physical, chemical and psychosocial hazards over the course of a working life accumulates as a significant determinant of health in later years. As retirement ages rise and working lives extend in response to demographic pressures, the quality of workplace environments becomes an increasingly important factor in shaping late life health outcomes. Programmes aimed at improving workplace safety, reducing exposure to harmful substances, and promoting occupational health have demonstrated strong economic

returns, with systematic reviews indicating that workplace health promotion can generate between 2.5 and 10.1 units of return for every unit invested, primarily through reduced absenteeism and lower healthcare utilisation among workers (Goetzel et al., 2014). Furthermore, the growing prevalence of digital technologies in the workplace introduces new forms of occupational stress, including technostress, which may particularly affect older workers less accustomed to rapid technological change. The intersection of workplace environmental health and digital transformation is examined further in Chapter 6 of this monograph.

Environmental health considerations must also be situated within the broader framework of health determinants. While individual lifestyle factors and socioeconomic conditions account for the largest share of health outcomes, environmental factors – encompassing both the physical environment and the built environment – contribute an estimated 10 to 30% depending on the analytical model employed (Hegyi & Bielik, 2011; OECD, 2019). For ageing populations, the cumulative effect of environmental exposures over the life course is particularly significant, as decades of exposure to air pollution, unsafe water, inadequate housing, food safety risks, and unfavourable urban design compound the biological processes of ageing. The regulation of food safety and nutritional content, including measures to reduce sodium levels in processed foods and to improve the transparency of nutritional labelling, represents an environmental health intervention with direct relevance to the prevention of diet-related chronic diseases prevalent among older adults. Comprehensive public health strategies for sustainable ageing must therefore integrate environmental health considerations across the full spectrum of physical, built, occupational, and nutritional environments.

3.5 Social Determinants of Health in Ageing Populations

Social determinants profoundly shape health outcomes in ageing populations across the Commonwealth. Economic security emerges as a fundamental determinant, with poverty rates among older adults varying widely between and within countries. New Zealand's focus on enhancing income security through continued employment opportunities and pension improvements demonstrates a commitment to addressing this

determinant. Similarly, Singapore's comprehensive Action Plan for Successful Ageing integrates health, employment, and financial security measures.

Social isolation and exclusion represent significant determinants affecting older adults' mental and physical health. Canada's focus on combating loneliness through community engagement and intergenerational programmes addresses these factors directly. Digital exclusion further compounds social isolation, with older adults in many Commonwealth countries facing barriers to technological participation. Initiatives like Singapore's Seniors Go Digital programme help bridge this divide, enabling older adults to maintain social connections and access essential services.

The relationship between digital exclusion and health outcomes among older adults warrants particular attention within the framework of social determinants, as the digitalisation of healthcare and social services increasingly mediates access to essential resources. As health systems adopt electronic appointment scheduling, online prescription management, telehealth consultations, and digital health information portals, older adults who lack digital skills or access to digital infrastructure face growing barriers to healthcare utilisation. This digital divide is not merely a matter of technological access but reflects deeper structural inequalities in education, income, geographic location, and social support networks. Older adults in rural areas, those with lower educational attainment, and those living alone are disproportionately affected. The consequences extend beyond reduced healthcare access to encompass social isolation, diminished civic participation, and reduced capacity for independent living – all of which are recognised determinants of health decline in later life. The empirical evidence on digital exclusion patterns among older populations in Central Europe, and their relationship to broader processes of social and economic marginalisation, is examined in detail in Chapter 6 of this monograph. Survey data from Slovakia and Poland illustrate the mechanisms through which digital inequality compounds existing health disparities across the life course.

Education levels throughout the life course significantly influence health outcomes in older age. Research indicates that additional time spent in formal education correlates with increased life expectancy and improved health literacy (Raghupathi & Raghupathi,

2020). Commonwealth countries can benefit by strengthening educational systems as part of broader strategies for healthy ageing, ensuring future generations are better prepared for longer, healthier lives.

By addressing these interconnected social determinants through coordinated, multisectoral approaches, Commonwealth countries can create more equitable conditions for healthy ageing across diverse populations. The public health landscape described in Chapter 3 is inextricably linked to the economic structures that both shape and are shaped by population ageing. Chapter 5 examines these economic dimensions.

3.6 Cost-Effectiveness of Public Health Interventions for Ageing Populations

The economic justification for investing in public health interventions, particularly those targeting ageing populations, has become increasingly robust over recent decades. The relationship between preventive expenditure and population health outcomes constitutes a critical dimension of any comprehensive strategy for sustainable ageing. Systematic evaluations across OECD countries have demonstrated that preventive care expenditures are a significant predictor of both life expectancy at birth and the reduction of avoidable mortality (OECD/European Observatory on Health Systems and Policies, 2021). Importantly, the marginal impact of additional investment in prevention has been shown to exceed that of equivalent increases in curative healthcare spending, suggesting that rebalancing healthcare budgets toward preventive approaches represents a more efficient allocation of finite public resources. This finding carries profound implications for countries confronting the fiscal pressures of population ageing, where the growing demand for curative and long-term care threatens to crowd out investment in the very preventive measures that could moderate future demand.

The accumulated evidence from population-level studies confirms that public health measures are frequently among the most cost-effective interventions available to health systems. A landmark systematic review conducted in the United Kingdom found that approximately two-thirds of evaluated public health interventions were cost effective, with a median return on investment of 14.3 to 1 (Masters et al., 2017). The magnitude of returns varies substantially by intervention type and level of implementation. Interventions delivered at the national level through legislative or

regulatory measures achieved the highest returns, exceeding 46:1, while health protection interventions yielded returns of approximately 34:1. At the other end of the spectrum, locally implemented health promotion programmes generated more modest returns of approximately 2:1 to 4:1 (Masters et al., 2017), underscoring the strategic importance of national-level policy interventions. Such measures reach large population segments at relatively low per-unit cost and generate benefits that accumulate across the entire demographic structure, including among older adults, for whom preventing disease complications is particularly cost-relevant.

Specific domains of preventive intervention demonstrate particularly compelling economic cases in the context of ageing populations. Tobacco control measures – encompassing taxation, media campaigns, school-based education programmes, legislative restrictions, and cessation support services – have consistently been evaluated as among the most cost-effective public health interventions available. These measures reduce not only tobacco consumption but also healthcare expenditure associated with cardiovascular disease, respiratory illness, and several forms of cancer (Chugh et al., 2023). Cessation support programmes have demonstrated positive returns on investment across multiple countries and contexts. A 2024 study of the New York Tobacco Control Programme found ROI estimates consistent with broader public health literature, where tobacco prevention interventions have shown returns ranging from 125% to over 1,900%. Evidence from the WHO and PAHO modelling of 124 low- and middle-income countries estimated that six cessation programmes could collectively help approximately 152 million tobacco users quit and save 2.7 million lives over the period 2021–2030 (Sandoval et al., 2022). When benefits were tracked until quitters reached age 65, the ROI was estimated at 7.50 – rising substantially compared to shorter investment horizons (Sandoval et al., 2022). These findings reinforce the economic rationale for cessation investment established in earlier European context modelling, including the EQUIPT framework applied across Hungary, the Netherlands, Germany, Spain, and England (Trapero-Bertran et al., 2018).

Immunisation programmes represent another domain of well-established cost effectiveness. Childhood vaccination against measles, mumps, and rubella has demonstrated benefit-cost ratios as high as 14:1, while adult influenza vaccination has

been evaluated as cost saving on a per person basis, preventing hospitalisations and averting deaths in both working-age and elderly populations (Chicoye et al., 2023). For ageing populations specifically, the cost effectiveness of influenza and pneumococcal immunisation grows with advancing age, as the severity of infection-related complications and associated treatment costs increase substantially among older adults with compromised immune function and multiple comorbidities. Human papillomavirus vaccination, while primarily targeting younger cohorts, represents a preventive investment with long-term implications for healthy ageing by reducing the future burden of cervical and other HPV-related cancers (Włoszek et al., 2025). The cost effectiveness of vaccination programmes is well supported by the broader literature, which identifies immunisation as one of the most consistently cost-effective categories of public health investment across diverse economic and demographic settings (Mauskopf et al., 2022).

Cardiovascular disease prevention illustrates the long-term economic logic of preventive investment in ageing societies with clarity. For ageing populations, among whom cardiovascular diseases represent the leading or second leading cause of death across virtually all countries, sustained investment in risk factor reduction represents one of the highest yield applications of preventive expenditure.

Fiscal instruments and nutritional regulation offer additional tools for population-level prevention. The taxation of sugar-sweetened beverages, as implemented in the United Kingdom, Mexico, and Ireland, has demonstrated measurable reductions in consumption within the first two years of implementation, with Mexico reporting an 8% decline in sales following the introduction of its sugar tax (Colchero et al., 2017). Modelling studies suggest that such measures can yield substantial population-level health benefits over the long term, with one Australian study estimating a gain of 270,000 disability-adjusted life years over the lifetime of the population from a comprehensive sugar taxation policy (Cobiac et al., 2017). The regulation of sodium content in processed foods has similarly been linked to reductions in the incidence of cardiovascular and other non-communicable diseases prevalent among older adults (Osoro et al., 2025). While fiscal measures may raise concerns regarding distributional equity, particularly as they can disproportionately affect lower-income consumers, their population-level health benefits and potential to reduce downstream treatment costs

make them a relevant instrument for countries confronting the fiscal pressures of demographic ageing.

The economic evaluation of public health interventions, however, presents greater methodological complexity than the evaluation of discrete clinical interventions. While cost-effectiveness analysis is well established for pharmaceuticals, medical devices, and surgical procedures, the assessment of population-level programmes targeting behavioural change, community health, or intersectoral policy coordination requires adapted methodological approaches. Interventions with broad population reach, multiple interacting components, and benefits that accrue over extended time horizons are difficult to evaluate using conventional randomised controlled trial designs, and the measurement of non-health benefits such as productivity gains, reduced informal care burden, and social participation improvements requires analytical frameworks that extend beyond traditional health economic models (Barratt et al., 2016). Despite these methodological challenges, the growing body of economic evidence strongly supports the proposition that strategic investment in preventive care, particularly when directed through stable government-financed channels, is associated with improved population health outcomes and generates long-term savings that offset initial expenditure. For ageing societies in which healthcare costs are projected to rise inexorably, the economic case for prevention is not merely compelling but fiscally imperative.

3.7 Measuring Public Health Performance in Ageing Societies

The capacity to measure and evaluate public health performance is essential for justifying sustained investment in preventive approaches and for ensuring that the institutional infrastructure necessary to address population ageing is adequately resourced. However, measuring public health system performance at the population level presents distinct conceptual and methodological challenges that have not been fully resolved. The methodological foundation for defining performance metrics in preventive care remains considerably weaker than for curative healthcare services, where indicators such as treatment outcomes, patient throughput, and clinical quality metrics are well established. In the preventive domain, commonly available indicators – such as the number of food safety inspections conducted, the number of health

information forms processed, or the volume of screening tests administered – are often distant from the outcomes they are intended to influence and provide limited insight into the effectiveness of preventive expenditure (Sasikumar Nair et al., 2026).

For ageing societies, the development of robust performance measurement frameworks for public health is not merely an academic exercise but a practical necessity with direct policy implications. As governments face growing pressure to demonstrate value for money in public expenditure, the ability to provide evidence-based assessments of the return on preventive investment will increasingly determine whether prevention receives adequate funding in competition with more visible curative care demands. Effective performance measurement must capture not only immediate outputs – such as vaccination coverage rates, screening participation, and health education programme reach – but also intermediate outcomes (for example, changes in risk factor prevalence) and long-term outcomes, including avoidable mortality, healthy life expectancy, and the compression of morbidity into the final years of life. The integration of these indicators into coherent monitoring frameworks, aligned with the expenditure categories of the System of Health Accounts 2011 methodology, would enable more rigorous cross-national comparison and policy learning, particularly among European countries facing similar demographic trajectories but operating under different institutional and financing arrangements.

4 Social Dimensions of Sustainable Ageing

This chapter lays the theoretical foundations for understanding ageing through a multidisciplinary lens that encompasses biological, psychological, social, environmental and cultural dimensions. The complexity of ageing in contemporary society requires integrated approaches and innovative thinking that transcends traditional understandings of social services. Multidisciplinary frameworks enable deeper understanding of the ageing process and its consequences for individuals and societies in the context of current global challenges, exploring how different theoretical perspectives contribute to sustainable ageing and what these imply for social work practice.

4.1 Theoretical Frameworks for the Social Dimensions of Sustainable Ageing

The need to redefine theoretical frameworks for social work with older adults in Slovakia stems from the urgency of demographic changes facing the country. According to demographic projections, Slovakia ranks among the countries with the fastest ageing population within the European Union, with this trend expected to culminate in the coming decades. As Bleha et al. (2018) note in their population forecast up to 2060, the ongoing transformation of the age structure will require fundamental revisions of existing knowledge and assumptions about the functioning of social systems. This irreversible demographic development underscores the need for a transition to a model of sustainable ageing, where social work ceases to be merely a reactive component (addressing problems as they arise) and becomes a proactive tool for social change.

The structural context within which social work with older adults operates in Slovakia is shaped by significant public health challenges that have direct social consequences. Slovakia belongs to the group of European countries with the highest rates of preventable and avoidable mortality, indicating substantial room for improvement through effective public health policies targeting premature deaths (OECD/European Observatory on Health Systems and Policies, 2021). While national programmes addressing obesity prevention, cardiovascular disease, HIV/AIDS and mental health exist in Slovakia, their coordination and systematic monitoring have been identified as areas requiring significant improvement (Ministry of Finance of the Slovak

Republic, Ministry of Health of the Slovak Republic, 2019). This policy fragmentation directly parallels the fragmentation of social services competencies identified throughout this chapter, suggesting a systemic governance challenge that transcends individual policy domains. In this context, theoretical approaches that focus not only on the biological deficits of age but also on the holistic development of older adults' potential come to the fore. Critical social work within this framework serves as a tool for deconstructing ageism, which is often fuelled by concerns about demographic change. At the theoretical level, this approach builds upon the principle of empowerment, which enables individuals to maintain control over their lives even in advanced age (Noordink et al., 2024; De Witte & Van Regenmortel, 2023). These approaches are crucial for achieving social justice, where demographic change is not perceived as a threat to the social system but as a challenge to build inclusive community care and intergenerational solidarity.

4.1.1 Critical Social Work and Its Application in Work with Older Adults

Critical social work provides an essential framework for understanding ageing not as a passive decline but as a process influenced by social structures and power relations. In this context, the deconstruction of ageism and stereotypes about ageing that shape the position of older people in society is crucial. The phenomenon of ageism in social work remains a widespread problem in both social work practice and broader society, manifesting in various forms and contexts. Combating it represents a fundamental challenge for social workers, as social work is inherently linked to the promotion of social justice. However, addressing this problem is complex, as the conceptual definition of ageism varies due to different measurement approaches and the persistent lack of consensus in scholarly definitions (Casaca Soares, 2025).

Several methods used in social work to address ageism highlight this complexity. Discursive approaches examine how ageism is experienced, constructed and challenged in the working lives of older adults. Critical reflection and advocacy also play a central role, as social workers examine their own practice, use inclusive language and actively advocate for intergenerational relationships (Previtali et al., 2022). Slovak legislation and strategic documents also respond to these theoretical challenges. In this

context, the National Programme for Active Ageing for 2021–2030 was adopted (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2021). Its primary objective is to support active ageing and mitigate the negative consequences of population ageing in the country. This programme creates space for implementing these principles, as it focuses on key areas such as:

- health and social inclusion;
- employment and education;
- active engagement of older adults in society.

Several specific elements in the National Programme for Active Ageing (NPAS) 2021–2030 directly correspond with critical social work and the need to deconstruct stereotypes. The programme focuses not only on technical assistance but also on changing societal perceptions. In this way, critical social work connects the theoretical deconstruction of prejudices with practical public policy objectives on the path to sustainable ageing. While critical social work theoretically deconstructs ageism, the National Programme for Active Ageing 2021–2030 operationalises these concepts into concrete policies, specific areas and measures:

1. Paradigm Shift: From Passivity to Participation (Critical Approach)

Critical social work rejects viewing older adults merely as objects of care. The National Programme adopts this approach in Chapter 5, entitled Support for Social Participation and Inclusion of Older People. Within specific measures, it defines the importance of supporting volunteerism among older adults and their involvement in advisory bodies at the municipal level. Social work thus does not merely provide services but acts as a facilitator that gives older adults back their voice (the so-called 'giving voice' approach), directly deconstructing the stereotype of older adults as passive recipients of assistance (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2021).

2. Combating Ageism in Language and Media

The National Programme in Chapter 7, entitled Support for Dignity, Independence and Quality of Life, explicitly addresses how ageing is discussed. Specified measures

focus on eliminating age stereotypes in media spaces and supporting campaigns that present ageing as a natural and valuable part of the life cycle. Social workers, within the critical approach, use inclusive language and educate the public to prevent the marginalisation of older people on the periphery of societal interest (Garnett et al., 2025; Repkova, 2018).

3. Digital Inclusion as a Tool for Social Justice

From the perspective of critical social work, the digital divide represents a new form of oppression. The National Programme responds to this within Chapter 2, entitled Support for Human Resources Throughout the Life Cycle. Consequently, specific measures in Slovakia focus on developing digital skills among older adults (e.g., through projects distributing tablets and providing training). Access to technology is not merely about developing digital skills but about increasing equality of opportunity and social justice. If an older adult lacks digital skills, they lose access to state information and services. Social work serves as a tool for equalising these structural inequalities (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2021).

4. Protection Against Abuse (Rights and Interests Advocacy)

Critical social work places a strong emphasis on safeguarding vulnerable groups against abuse of power and systemic oppression. This theoretical imperative finds its practical application in the seventh area of the National Programme. Within specific measures, the programme focuses on older adults by raising awareness about violence against older people and strengthening monitoring mechanisms in social service facilities.

Social workers ensure that, for instance, institutional care does not become a space for systemic oppression but a place respecting individual autonomy. The aim is not only to detect physical or psychological abuse but also to prevent neglect of care. From a critical perspective, the social worker assumes the key role of advocate. Their role is not merely administrative case management but active oversight to ensure that institutional care respects individual autonomy and dignity. This supports maximum possible respect for individual autonomy, integrity and the older adult's right to self-

determination, thereby directly fulfilling the goals of sustainable and dignified ageing (Repkova, 2018).

4.1.2 Empowerment in Working with Older Adults

The concept of empowerment, also referred to in Slovak professional discourse as 'splnomocnenie' (authorisation) or 'posilnenie' (strengthening), represents a key mechanism in gerontological social work. It is a process through which older adults, as individuals, but also their families and communities, acquire the ability to control their living conditions, more effectively confront the barriers of ageing and increase their participation in social life. Social workers applying this concept focus not only on individual assistance but strive to change social structures that perpetuate inequality and exclusion of older people (Lovrits & Kalenda Vávrová, 2025). According to Kozubik et al. (2025), this process is inherently linked to social justice and the removal of discriminatory barriers that prevent older adults from fully utilising their potential.

A critical point in caring for older adults is the transition from a model of passive recipient of help to one of active participant. Stoykova (2024) emphasises that empowerment requires direct involvement of older adults in decision making processes, thereby strengthening their social and political identity. Social work thus ceases to be merely a unilateral provision of services and becomes a space for developing the older person's own competencies. According to Noordink et al. (2024), the goal of this process of 'becoming powerful' is for older adults to collectively advocate for their group interests and gain control over their everyday reality. This approach is particularly necessary for those groups of older adults who find themselves in disadvantaged or marginalised positions.

The role of the social worker in empowering older adults is connected with the need to critically reflect on how power structures in society limit the lives of older people and their ability to achieve change (Stoykova, 2024). De Witte & Van Regenmortel (2023) in this context define empowerment in social work as the conscious transfer of power from the worker to the client. In practice with older adults, this means:

- supporting autonomy in decision making about their own care;
- strengthening control over external factors affecting life in old age;

- creating space for effective management of life challenges.

This approach fundamentally transforms traditional paradigms of social service provision, in which the older adult was considered primarily a passive recipient of help. Empowerment in social work instead recognises the older adult as an active agent of their own life, possessing knowledge, experience and capacities for self-determination (Kam, 2023).

Education and support represent important components of empowerment for older adults. Social workers can provide older adults with information and develop skills they need to manage their own health, navigate the health and social care system, and access community services (Tanner et al., 2025). Lifelong learning programmes, digital literacy and health education significantly contribute to strengthening older adults' competencies and their ability to actively participate in social life. Such interventions not only bring practical benefits but also strengthen self-confidence, social self-efficacy and overall feelings of empowerment among older people (Noordink et al., 2024; Stoykova, 2024). The operationalisation of empowerment in the context of working with older people encompasses four basic components: emotional, cognitive, relational and behavioural (Kozubik et al., 2025; Zhang et al., 2023). The emotional component relates to strengthening the older adult's self-esteem and self-confidence, which are often undermined by age stereotypes and marginalisation in society. The cognitive aspect focuses on developing critical thinking and capacities for informed decision making. The relational component emphasises the importance of social relationships and networks for strengthening the position of older adults, while the behavioural aspect is oriented toward active participation and engagement of older people in family and community life (De Witte & Van Regenmortel, 2023).

Social work with older adults should prioritise their capacities, strengths and resilience instead of deficits or limitations associated with ageing (Grigoraş et al., 2025; Lovrits & Kalenda Vávrová, 2025). This strengths-based approach enables older adults to take control of their own lives; make informed decisions and gain access to the support they need to maintain their autonomy and dignity. Identifying and valuing the

skills, knowledge and life experiences of older adults represents a fundamental step toward their empowerment (Kam, 2023).

The empowerment approach in working with older adults emphasises five basic principles:

- dignity and respect regardless of personal circumstances
- control over their own lives, including the ability to make choices and perform activities independently where possible
- active participation in family and community life and recognition of their views in social policy and practice
- equality of treatment and protection of rights equivalent to those of other citizens
- safety, including adequate income and access to secure housing (Noordink et al., 2024).

The implementation of the empowerment approach in social work practice is not without challenges and dilemmas. Steiner et al. (2023) warns of the danger that government policies may only formally appropriate the concept of empowerment, turning it into an empty slogan without real impact on the lives of older adults. Not every older adult has the same ability to make choices, and this fact must be taken into account in social work. For example, older adults with cognitive decline or those placed in residential facilities may not have a real opportunity to leave these facilities, even if they are dissatisfied with the care provided (Moilanen et al., 2021).

4.1.3 Social Justice and the Rights of Older Adults in the Context of Sustainability

The connection between social justice, the rights of older adults and environmental sustainability represents a complex theoretical framework that integrates dimensions of human rights, social justice and ecological responsibility. This integrated approach stems from the premise that dignified ageing cannot be separated from broader questions of social and environmental justice (Buffel & Phillipson, 2024; European Commission, 2021). This paradigmatic shift emphasises that adequate healthcare, dignified housing, social protection and participation are not privileges but fundamental human rights that belong to all people regardless of age (Quintiá Pastrana,

2025). The European Pillar of Social Rights explicitly establishes the right of older people to adequate financial resources enabling a dignified life, the right to timely access to affordable preventive and curative healthcare, as well as the right to affordable long-term care services (European Commission, 2021).

According to McKay et al. (2024), within the population of older adults there are specific subgroups particularly vulnerable to violations of their rights. These include older women, LGBTQ+ older adults, migrants and older adults living in rural or marginalised areas. At the micro level, social work can empower individuals through counselling and education by reframing their needs as human rights. While the micro level focuses on direct work with individuals, the mezzo and macro levels enable social workers to pursue broader systemic change. In practice, this means shifting toward advocacy strategies, where social workers engage in community work and its various models (community organising, community education, community development, etc.) to support the rights of older adults (mezzo level) or actively comment on legislation and challenge ageism through the media (macro level).

The European Union has committed to achieving a just and inclusive future. Sustainable transformations must lead to the well-being of current and future generations, while respecting ecological limits and addressing existing injustices associated with environmental degradation and climate change (European Environment Agency, 2024). Older adults are exposed to the negative impacts of climate change, including extreme heat, floods and air pollution, among many others, which have adverse effects on their health as well as their well-being and social welfare (Tipaldo et al., 2024).

The concept of social justice in sustainable transformations encompasses three basic dimensions: procedural justice (participation of all stakeholders including older adults in decision-making processes), distributive justice (equitable distribution of benefits and burdens of environmental policies), and recognition justice (respect for the diversity of values, perspectives and experiences of different age groups) (European Environment Agency, 2024). Examples from countries such as Finland and Slovenia

demonstrate that consultations with older adults in climate policy planning can lead to better and more inclusive solutions (European Environment Agency, 2024).

Both countries work with the theme of intergenerational justice, which is gaining increasing importance in the context of population ageing and sustainable development. Casal (2024) stressed that each generation should leave the next sufficiently good conditions for life – this principle of sustainability forms the moral basis for evaluating justice between generations. In the European context, however, a significant asymmetry in favour of older generations in social spending is evident, raising questions about the long-term sustainability of social systems. Central European countries, including Slovakia, face a particularly challenging situation due to unfavourable trends in the labour market, lifestyle and social policy over the past two decades, combined with rapid population ageing in the next two decades (Cristea et al., 2020). The EU Green Deal and Cohesion Policy 2021–2027 explicitly links social inclusion with spatial justice, calling for the integration of demographic futures into regional planning (European Commission, 2021).

4.2 The Social Services System in Slovakia in the Context of Sustainable Ageing

The social services system in Slovakia is currently undergoing significant transformations motivated by demographic changes, growing demand for long-term care services and efforts to ensure long-term financial sustainability of the system. According to Act No. 448/2008 Coll. on Social Services, social services are defined as professional activity, service activity or other activity or a set of these activities aimed at preventing, addressing or mitigating the adverse social situation of an individual, family or community (Act No. 448/2008 Coll.).

The sustainability of community-based social services for older adults in Slovakia is inseparable from broader questions of population health and preventive care investment. Poor health outcomes among the older population increase demand for both healthcare and social services simultaneously, creating compound fiscal pressure. Slovakia's preventable mortality rate of 189 cases per 100,000 inhabitants in 2019 – among the highest in the EU – translates directly into elevated social care needs, as survivors of cardiovascular events, oncological treatments and respiratory conditions

frequently require ongoing social support and long-term care (OECD/European Observatory on Health Systems and Policies, 2021). Investment in prevention therefore represents not only a healthcare efficiency measure but a direct strategy for moderating future social care demand.

4.2.1 Ecosocial Approach in Social Services

The connection between social services for older adults and environmental sustainability represents a relatively new but increasingly significant direction in conceptual thinking about the future of care. The concept of green social services stems from the assumption that facilities and services for older adults can and should be designed and operated in ways that minimise negative environmental impact, promote healthy environments and contribute to broader sustainable development goals (Chen et al., 2022). The concept of Green Longevity represents the integration of climate themes into healthy ageing, addressing the vulnerabilities of older adults while engaging them in climate issues (Zhang, 2025). This framework recognises that older people are physiologically, socioeconomically and psychologically vulnerable to climate change, and therefore interventions must be comprehensive and targeted.

At the practical level, the ecosocial approach to social services can encompass a wide spectrum of measures in facility design and operation. Strategic placement of green roofs and community gardens can reduce urban heat islands, cool the environment and create accessible spaces where older adults can engage in physical activity and social inclusion (Enssle & Kabisch, 2020; Tipaldo et al., 2024). The integration of green spaces into the design of social service facilities is not merely a matter of aesthetics but directly contributes to the health and well-being of older adults. Research demonstrates that access to nature and green environments can reduce stress, improve cognitive function and enhance overall quality of life among older populations (Enssle & Kabisch, 2020). Moreover, sustainable building practices, including energy efficient design, renewable energy sources and water conservation measures, can reduce operational costs while modelling environmental stewardship.

Older people need not be only passive recipients of green interventions but can be active agents of environmental sustainability through volunteerism. Participation in

environmental volunteerism provides older adults with opportunities for active ageing and social inclusion (Pillemer et al., 2017; Chen et al., 2022). Activities such as community gardening, urban greening projects, environmental education and conservation work enable older adults to contribute meaningfully to their communities while maintaining physical activity and social connections. This dual benefit – environmental improvement and individual well-being – exemplifies the potential of the ecosocial approach for creating sustainable, mutually reinforcing systems.

4.2.2 Ecosocial Practice in Slovakia

In Slovakia, ecosocial approaches to social care are beginning to emerge, though implementation remains limited and fragmented. Social innovations in this area include community garden projects associated with day centres for older adults, green care initiatives that incorporate horticultural therapy, and pilot programmes integrating environmental education with intergenerational activities. However, systematic integration of ecosocial principles into social service design and delivery has yet to be achieved. The current focus on deinstitutionalisation and community-based services (Cangárová & Krupa, n. d.) presents an opportunity to embed environmental sustainability from the outset rather than retrofitting existing systems. As Slovakia develops its reformed social services financing model and expands community-based provision, explicit attention to ecosocial dimensions could enhance both environmental outcomes and the quality of life for older adults. This represents not merely an environmental imperative but a holistic approach to sustainable ageing that recognises the interconnection between individual well-being, community resilience and ecological health (Maheswari & Yesudian, 2025). Future research and practice development in Slovakia would benefit from systematically exploring how ecosocial principles can be operationalised within the specific constraints and opportunities of the Slovak context.

4.2.3 Community Dimension of Sustainable Ageing

The concept of ageing in place emphasises the ability to live in one's own home safely and independently (Straughan et al., 2025). In the context of Slovak community work, this model relies on activating natural support networks. One of the roles of the social worker in community work is that of facilitator, helping older adults identify and

utilise resources in their immediate surroundings. Local communities represent an opportunity for sustainable ageing, enabling older adults to remain in their natural environment as long as possible. Community social services and social work with older adults recognise that residents are typically part of a network of relationships and contacts. This network includes relationships with family, neighbours and friends, which represent important sources of support and strength in the community (Seifert & König, 2019). Mapping these networks and building local partnerships between local government and older adults is a key competency developed through community development and community organising (Šrobárová et. al., 2021). As Buffel & Phillipson (2024) describe, the community network therefore plays a very important role in planning and meeting the needs of residents in a particular territory. Adequate knowledge of values and traditions in a given locality can significantly contribute to the effectiveness of social work and service provision (Seifert & König, 2019).

Social networks form an informal but critically important dimension of support for older adults. Strong social networks are associated with reduced risk of social isolation (Holt-Lunstad, 2024). Social work can facilitate the building and maintenance of older adults' social networks through community work, sharing common interests, developing new relationships and strengthening existing bonds. Less formal community settings, such as shops, restaurants or community centres, provide a familiar and accessible social network where older adults can meet and interact.

Stanková and Bindasová (2022) emphasise that intergenerational solidarity represents a key mechanism for creating cohesive and resilient communities in which different generations live alongside and support one another. Similarly, Šolcová and Holíková (2023) argue that community work in ageing societies represents a strategic opportunity to develop two complementary levels that are crucial for the quality of life of older adults: improving living conditions and community development.

- **Improving living conditions (environment-focused level).**

At this level, social work focuses on adjusting external factors of community life to support the concept of ageing in place (Stanková & Bindasová, 2022). This involves creating a safe, barrier-free and inclusive environment that facilitates

older adults' access to services, culture and social contacts. Communities' engagement work acts as a catalyst for changes in infrastructure and accessibility of local support, thereby directly improving objective conditions for dignified ageing (Galof, 2023).

- **Community development (personal and competency development level).**

This level demonstrates that from the perspective of sustainable active ageing, the activation of internal community factors is equally important. Within the empowerment process for older adults, the aim is not only to provide help but also to strengthen competencies, knowledge and self-confidence. This multifaceted approach encompasses three interconnected dimensions of capacity building: human capacity development focuses on enhancing older adults' knowledge of their rights and possibilities for active participation in community life; social capacity building emphasises the cultivation and strengthening of intergenerational relationships and neighbourhood solidarity; and structural capacity development, as Šolcová and Holíková (2023) note, supports the establishment of seniors' groups or councils that can effectively articulate their needs and priorities to local government. Together, these dimensions enable communities to influence and transform existing institutional and political structures, strengthening the position of older adults so that they become genuine partners with local government, capable of shaping local ageing policies and dismantling systemic barriers such as ageism in service access. Social workers, according to Stanková and Bindasová (2022), act as agents of change in this process, contributing to the strengthening of intergenerational connections through advocacy, community organising, programme development and the application of systems theory.

The community dimension of sustainable ageing also encounters certain limitations in Slovakia. Current discourse on sustainable ageing in Slovakia is inseparably connected with the process of deinstitutionalisation of social services. This transition from large capacity facilities to community-based services is not only a matter of fulfilling the human rights of older adults but also a matter of systemic sustainability. Gousia et al. (2024) and Curioni et al. (2023) demonstrates that home and community

care represents a less expensive model than care in residential facilities, as it more effectively utilises existing resources in the natural environment. Community development, as Šolcová and Holíková (2023) argue, represents a response to the limitation of deinstitutionalisation in the context of insufficient financial resources. Despite its economic advantages, the system in Slovakia faces a critical shortage of professional personnel and caregivers.

Community work thus encounters structural barriers such as personnel shortages and financial instability. It is precisely at this point that community development becomes an essential tool for sustainability. Dushkova and Ivlieva (2024) emphasise that community development prioritises self-help and activation within the community, focusing on empowering community members themselves to unite in addressing common needs. The goal is not to provide services to older adults through a traditional service providing approach to social work, but rather to help develop an empowerment approach. Kastl et al. (2024) notes that the overlaps between the stakeholders' needs offer chances and challenges at the same time for the development of user-friendly, acceptable (digital) solutions and products that support ageing in place.

Community work as a professional method of social work is guided by specific principles, procedures and patterns that distinguish it from spontaneous activism or one-off social interventions (Grundělková et al., 2022). The community work process represents a structured path from identifying needs to collective change, where older adults and their social environment act as equal partners. Creating an action group that includes not only older adults, but also active members of their surroundings (family, neighbours, local leaders) ensures that proposed solutions arise from their actual needs (Andrašiková, 2020). Collectively defining and selecting what needs to be strengthened in the community requires gathering perspectives across generations to reveal the causes of problems and identify the community's potential to address them. Finding solutions and planning emphasise approaches that strengthen intergenerational bonds and utilise local material and human resources (Šolcová & Holíková, 2023).

Communities often share common interests and values determined by culture, traditions, history, relationships, ethnicity, religion and many other variables. These

shared values can relate both to the personalities of individual community members and to the specific characteristics of the community as a whole, and it is important for a community worker to understand them. Values, together with needs, interests and attitudes, create incentives for human action (motivation) and determine the direction of this action (Grundělková et al., 2022). In working with older adults, it is particularly important to respect generationally specific values and traditions that may influence their willingness to participate in community activities and their preferences regarding forms of support.

The success of the community dimension of sustainable ageing is associated with how well the community has been activated and whether the change will also affect those people who have not participated in specific activities (Šiňanská & Šlosár, 2020). For older adults, this means that even if they cannot or do not want to actively participate in community activities due to health limitations or other barriers, they still benefit from an improved physical and social environment, strengthened community cohesion and reduced age stereotypes (Stanková & Bindasová, 2022).

4.3 Subjective Self-Efficacy of Older Adults as a Foundation for Sustainable Ageing: An Empirical Investigation

The theoretical frameworks of critical social work and empowerment, while essential for understanding structural barriers to sustainable ageing, address only one dimension of the challenge. Equally crucial, though often overlooked, is the internal dimension: older adults' subjective perception of their own agency. The empowerment process is not limited to redistributing power within social structures or enacting legislative reforms. Instead, it is fundamentally rooted in what Kozubik et al. (2025) refer to as the cognitive dimension of empowerment: the subjective self-efficacy originally defined by Bandura (1997) as an individual's belief in their ability to organise and execute the steps required to manage challenging life situations. Without this internal conviction of competence, even the most progressive systemic changes remain merely untapped potential. The transition from passive receipt of help to active participation (Noordink et al., 2024) depends fundamentally on the extent to which older adults

perceive themselves as subjects capable of influencing their own lives, even within the objective constraints that advanced age may bring.

Sustainable ageing in Slovakia cannot be built without a deep understanding of how older adults themselves experience autonomy, competence and control. While the preceding analysis examined structural configurations and systemic fragmentation, this empirical investigation shifts focus to lived experience: How do these structures shape older adults' identities? Do they perceive themselves as competent persons with their own voice, or has the combination of internalised ageism and limited-service provision led them to resign their autonomy and accept a position of dependency? These questions have important implications. If community development is to function as more than methodological rhetoric, it must rest on genuine self-efficacy among community members. The present investigation therefore does not examine the technical parameters of social support, but rather the phenomenology of ageing in contemporary Slovakia: the extent to which older adults experience themselves as autonomous actors in their everyday lives, and where they locate resources for maintaining independence.

Sustainable ageing is not merely a question of the stability of social systems but primarily a question of preserving the internal integrity and self-efficacy of older adults. When an older adult perceives themselves as competent (rather than a passive object of care), they can more effectively mobilise their internal resources, which is a fundamental prerequisite for long-term quality of life in the home environment. The objective is therefore to ascertain how older adults in Slovakia reflect on their own capacity to influence the quality and direction of their lives.

The empirical investigation focuses on three levels of self-perception:

- Research sub-question 1. Area of investigation: perception of own competence (self-efficacy): *To what extent do older adults in Slovakia perceive their own competence (self-efficacy) in addressing life challenges and changes in their environment?*
- Research sub-question 2. Internal image of one's own old age (identity): *How is the image of their own usefulness and potential for personal development*

reflected in the subjective identity of older adults, in contrast to society-wide stereotypes about old age?

- Research sub-question 3. Subjective sense of control over life direction: *How do older adults reflect on the degree of control over the direction of their lives, and in which areas of everyday existence do they experience the highest degree of independence?*

4.3.1 Materials and Methods

Study Design

This investigation employs a case study design to examine subjective self-efficacy among older adults in Slovakia. Case study methodology is particularly appropriate for exploring complex social phenomena within their real-life contexts, especially when boundaries between phenomenon and context are not clearly evident (Yin, 2018). As Creswell & Poth (2017) argue, case studies enable in-depth, multi-faceted exploration of contemporary issues in their natural settings, making them especially valuable for understanding how older adults experience and construct meaning around their autonomy and agency.

The case study examines individuals actively participating in Older Adults Social Clubs across four regional territories of Slovakia. This bounded system provides a focused yet sufficiently diverse context for examining how self-efficacy manifests among those older adults who maintain community engagement. Within this case study framework, a phenomenological approach was adopted to capture the lived experiences of participants. Phenomenology, as Tavakol & Sandars (2025) described, is particularly well-suited to this investigation because it prioritises first-person accounts and seeks to understand how individuals make sense of their experiences from their own perspective. Unlike approaches that impose external frameworks, phenomenology allows the meanings older adults themselves attribute to autonomy, competence and control to emerge authentically from their narratives (Creswell & Poth, 2017). This methodological alignment is essential for addressing research questions concerned with subjective perceptions of self-efficacy, identity and life direction, phenomena that can only be accessed through the interpretive lens of those who live them.

The research design of the monograph is conceived as a combined approach. The primary contribution is the synthesis and integration of knowledge interpreted through the prism of an ecosocial approach to aging. This theoretical model is subsequently tested through empirical examination of selected determinants (self-efficacy, digital literacy), thus connecting theoretical abstraction with concrete social reality.

Sample and Inclusion Criteria

The research sample consisted of a total of 51 participants (10 men and 41 women) divided into four focus groups. Participants were recruited through a snowball sampling technique in cooperation with older adults' clubs, which for purposes of international comparison are defined as Older Adults Social Clubs (Gundumogula, 2020).

The study included older adults who: (1) were aged 60+ years; (2) possessed the ability to understand content and express their thoughts; (3) lived in a home environment; and (4) spoke Slovak. The age range of participants was from 63 to 87 years (mean age 72.45 years). The sample was heterogeneous in terms of educational attainment, ranging from primary to doctoral level (PhD). All participants provided informed written consent, and full anonymity was ensured through interview transcription.

Case Study Context

One of the most serious structural problems with the current social services system in Slovakia is the fragmentation of competencies and the lack of transparency in financing. The system is characterised by a dispersal of responsibilities among state administration, regional self-government and local self-government, leading to insufficient coordination and unclear division of responsibilities (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2024). This fragmentation is compounded by unstable financing arrangements that undermine the predictability and long-term sustainability of service provision.

The system exhibits a marked preference for residential forms of social services, particularly for older adults with higher degrees of dependency. This orientation

contradicts principles of sustainable ageing, which emphasise ageing in place, remaining in their natural home and community environments as long as possible (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2024). Institutionalisation represents not only a more expensive alternative but can also negatively impact well-being and quality of life as older adults lose contact with their natural social environments (Cangárová & Krupa, 2023).

Reform efforts, including the introduction of multi-source financing mechanisms and integrated assessment procedures (Act No. 376/2024 Coll.), represent attempts to address these challenges. However, implementation faces significant obstacles, including concerns about adequate financing for ambulatory and outreach services, precisely those services most crucial for supporting community-based ageing (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2024). The reform's postponement from January 2025 to September 2026 reflects the complexity of systemic transformation and prolongs uncertainty for both providers and service recipients.

Ethical Approval

The study protocol and related documents were approved by the Ethics Committee of Matej Bel University in Banská Bystrica within the framework of the VEGA project funded by the Research Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic (grant no. VEGA 1/0124/24), 'Slovakia in the Context of the Pension Index and the Ageing Population Index – a Future Perspective'.

Data Collection

Data collection was conducted through semi-structured focus group interviews with older adults in Slovakia. Prior to the main data collection, a pilot discussion was conducted to validate the prepared semi-structured interview guide (Gundumogula, 2020). Data collection took place from September to November 2025 in four regions of Slovakia (west, north, centre and east).

Interviews were conducted on the premises of older adults' clubs in the cities of Banská Bystrica (77,000 inhabitants), Trnava (65,000), Kežmarok (17,000) and Košice (230,000) (*all figures approximate*).

The semi-structured interview guide began with open-ended questions designed to stimulate spontaneous discussion. In order to encourage participants to openly describe their experiences, a key prerequisite of the phenomenological approach, researchers tried to create an atmosphere of mutual respect and trust (Creswell & Poth, 2017). Interviews were audio-recorded on digital devices, with durations ranging from 35 to 45 minutes. Recordings were subsequently transcribed verbatim into written form, creating a textual corpus for analysis.

Data Analysis

This study employed phenomenological analysis following the methodological procedures of Lindseth and Norberg (2004), which consist of a three-phase interpretive process (see Table 4.1 for illustration of the complete analytical journey).

Phase 1 (Naive Understanding), textual transcripts were approached holistically to grasp initial meanings. This involved spontaneous interpretation of the phenomenon with attention to researcher pre-understandings, formulating an initial image of what the text reveals about older adults' self-efficacy in their natural environment.

Phase 2 (Structural Thematic Analysis) involved a systematic examination conducted through four iterative steps. First, the text was divided into meaning units – discrete segments of participant narratives. Second, similar meaning units were grouped into six primary categories: domestic competence, institutional incompetence, digital exclusion, usefulness as dignity, home versus institution, and internal competence versus external dependency. Third, these categories were connected into broader sub-themes representing core experiential patterns. Finally, the sub-themes were synthesised into three main themes corresponding to the research questions: Fragmented Autonomy, Proactive Identity, and Home as Control. This cyclical process involved retrospective confrontation of emerging themes with the naïve understanding in order to achieve deeper structural precision.

Phase 3 (Comprehensive Understanding) represents critical synthesis wherein identified themes were connected with external sources – previous research, theoretical frameworks (particularly empowerment and critical social work), and philosophical foundations. As illustrated in Table 4.1, this phase enabled transcendence from

description to comprehensive conclusions about how structural ageism operates through system design rather than individual deficit, how older adults actively resist objectification, and why sustainable ageing requires power redistribution rather than mere service provision (Lindseth & Norberg, 2004).

Table 4.1: Phenomenological Analysis Process

Phase	Analytical Process	Example	Output	References
Phase 1: Naïve Understanding	Initial holistic reading of transcripts	Participants manage household independently but feel helpless with bureaucracy; technology both empowers and excludes; strong preference for home over institutions	Self-efficacy fragmented; independence = remaining at home; systems function as barriers	Creswell & Poth (2017)
Phase 2a: Meaning Units	Extract discrete meaning segments	"I continue productive work – horticultural work ... This sense of utility sustains my dignity." (P11, M) "My daughter handles these matters, as I would spend entire days without comprehending the procedures." (P8, F)	Individual coded statements identified	
Phase 2b: Categories	Group similar units	(1) Domestic competence; (2) Institutional incompetence; (3) Digital exclusion; (4) Usefulness as dignity; (5) Home vs. institution; (6) Internal competence vs. external dependency	Six primary categories	

Phase 2c: Main Themes	Synthesise into overarching themes	Theme 1: Fragmented Autonomy; Theme 2: Proactive Identity; Theme 3: Home as a Space of Control	Three themes corresponding to research sub-questions	
Phase 3: Comprehensive Understanding	Connect to theory and literature	Lovrits & Kalenda Vávrová (2025): power structures limit agency; Noordink et al. (2024): "becoming powerful"; Straughan et al. (2025): ageing in place	Structural ageism operates through system design, not individual deficit. Sustainable ageing requires power redistribution (transformational model), not mere service provision (assistance model).	Lindseth & Norberg (2004)

Source: Authors' elaboration based on Lindseth & Norberg (2004). RSQ = Research Sub-question.

4.3.2 Results

The analytical process progressed from examining individual participant statements to systematically categorising these insights and identifying broader patterns within the data. To provide a clear overview of this progression, the findings were organised into three main themes that directly address the research questions. Table 4.2: (1) Fragmented Autonomy and barriers to self-efficacy, (2) Proactive Identity and resistance to ageist stereotypes, and (3) Home as space of control and autonomy. These themes were then integrated with theoretical frameworks of empowerment and critical social work to illuminate how structural ageism operates in the Slovak context.

Table 4.2: Overview of Main Themes, Categories, and Research Sub-questions

Theme	Core Categories	Representative Participant Voice	Research Sub-Question
Theme 1: Fragmented Autonomy	Domestic competence; Institutional incompetence; Digital exclusion;	"The challenge is not change itself but being severed from it." (P10, Male)	RSQ 1: Perception of own competence (self-efficacy)

	Loss of corrective capacity		
Theme 2: Proactive Identity	Active learning & adaptation; Usefulness as existential foundation; Expert identity vs. dependent status	"I refuse to become anachronistic. One cannot afford complacency, lest society progresses beyond one's capacity to participate." (P25, Female)	RSQ 2: Internal image of own old age (identity)
Theme 3: Home as Space of Control	Home as locus of autonomy; Technology as instrument not replacement; Institutional care as symbolic loss	"Provision of care within the domestic environment would be preferable, as it would preserve my sense of decisional authority." (P12, Female)	RSQ 3: Subjective sense of control over life direction

Source: Authors' own analysis, 2025.

Theme 1: Fragmented Autonomy and Barriers to Self-Efficacy

The first main theme reveals that older adults experience self-efficacy as fundamentally fragmented across different life domains. Participants consistently demonstrated high levels of competence and confidence in managing familiar, everyday activities within their private domestic sphere. They described autonomous functioning in household management, gardening, personal care, and routine decision making. However, this sense of competence sharply contrasted with experiences of profound helplessness and disempowerment when engaging with institutional systems, bureaucratic processes, and digital technologies.

The fragmentation manifests in three distinct but interconnected categories. First, participants exhibited what can be termed selective competence: they feel capable and effective in contexts they know well but encounter barriers in unfamiliar institutional environments. Second, digital and cognitive exclusion emerged as a critical barrier: the inability to navigate modern communication systems and administrative procedures led

to feelings of being cut off from essential information and services. Third, participants described a progressive loss of corrective capacity: the distressing awareness that they are losing not only the ability to manage certain tasks but, more critically, the tools and agency to correct problems when they arise.

In matters I understand, I manage independently... I maintain my garden and household. But regarding bureaucratic procedures, I await assistance. Not due to lack of effort, but because the system has become incomprehensible. (P4, Female)

I fear inadvertent technological errors, as even doctor's appointments now require electronic scheduling. The offices, the paperwork ... My daughter handles these matters, as I would spend entire days without comprehending the procedures. (P8, Female)

Participants expressed particular anxiety about technological systems that mediate access to essential services. The requirement to use digital platforms for healthcare appointments, banking, government services, and communication created situations where previously competent individuals felt reduced to dependency. This was not experienced as a natural consequence of ageing but as an imposed barrier that transformed them from autonomous actors into passive recipients requiring constant assistance.

The sense of losing control over corrective mechanisms proved especially distressing. Participants described situations where external factors, rent increases, legislative changes, and healthcare access restrictions felt entirely beyond their influence. This powerlessness was compounded by the perception that systemic complexity functioned as an intentional barrier rather than an unfortunate consequence of modernisation.

The challenge is not change itself but being severed from it. I experience a sense of superfluousness, of being rendered obsolete. (P10, Male)

What frightens me is the progressive loss of control. When my rent increased ... what recourse exists? I possess progressively less control over my existence. (P6, Female)

Theme 2: Proactive Identity and Resistance to Ageist Stereotypes

The second main theme demonstrates that older adults actively resist societal narratives that position them as passive, declining, or merely 'living out their days'. Participants consistently articulated a strong sense of ongoing identity as capable, learning, contributing members of society. This proactive self-concept manifests through continued engagement with learning opportunities, maintenance of productive activities, and deliberate efforts to remain up to date and relevant.

Three interconnected categories comprise this theme. First, active learning and adaptation emerged as central to identity maintenance. Participants described pursuing new knowledge and skills, including digital literacy, not as optional enrichment but as essential for maintaining dignity and social participation. Learning was framed as a means of 'keeping pace' with society and resisting obsolescence. Second, usefulness as existential foundation revealed that the ability to contribute, whether economically, socially, or practically, was intrinsically linked to participants' sense of self-worth and life meaning. Loss of the capacity to be useful was perceived as tantamount to loss of purpose. Third, participants with professional backgrounds experienced a profound tension between expert identity and dependent status, wherein their internal sense of competence and expertise remained intact even as external circumstances increasingly positioned them as objects requiring care rather than subjects with agency.

In the current era, technological literacy has become a necessity. I refuse to become anachronistic. One cannot afford complacency, otherwise society progresses beyond one's capacity to participate. (P25, Female)

I continue productive work – horticultural work, which provides both sustenance and financial contribution through occasional employment opportunities. This enables me to care for myself and still benefit my daughter's household. This sense of utility sustains my dignity. (P11, Male)

Participants demonstrated what can be understood as an emancipatory resistance to the passive ageing narrative imposed by societal stereotypes. Rather than accepting definitions of themselves as diminished or finished, they actively sought opportunities to demonstrate ongoing capacity and contribution. This was evident in

descriptions of volunteer work, community engagement, intergenerational support, continued employment or productive labour, and deliberate acquisition of new competencies.

The tension between internal competence and external perception proved particularly acute for those with professional or expert backgrounds. These participants described the dissonance of possessing unchanged cognitive capabilities and professional knowledge while simultaneously being positioned by family members, healthcare systems, and social services as individuals requiring management and care.

The knowledge I acquired throughout my professional development continues to expand my intellectual horizons. (P14, Female)

Cognitively, I remain unchanged ... Throughout my career in healthcare, I preserved lives. Yet now I require others' care. I experience myself as object rather than subject of my own existence. This inversion is profoundly distressing. (P13, Female)

Theme 3: Home as Space of Control and Autonomy

The third main theme reveals that subjective sense of control over life direction is fundamentally tied to the ability to remain in the home environment. For participants, independence was not defined as complete self-sufficiency or the ability to perform all tasks without assistance. Rather, independence meant the capacity to remain in familiar surroundings where they maintain decisional authority over daily routines, social interactions, and the basic rhythms of existence.

This theme comprises three critical categories. First, home as locus of autonomy demonstrates that the domestic environment represents the primary space where older adults feel they retain agency and control. Any threat to their ability to age in place, whether from health decline, financial pressures, or service gaps, was perceived as existential threat to autonomy itself.

Second, technology and support as instruments rather than replacements reveals that participants did not object to assistance per se, but rather to assistance that stripped them of decisional authority. When technologies, care services, or family support were experienced as tools that enabled continued functioning in chosen

activities, they enhanced self-efficacy. When imposed without consultation or understanding, the same supports were experienced as infantilising and disempowering.

Third, institutional care emerged as a symbolic loss of control, with placement in residential facilities representing the definitive endpoint of autonomous existence, regardless of the quality of care provided.

Provision of care within the domestic environment would be preferable, as it would preserve my sense of decisional authority over my own circumstances. (P12, Female)

Technologies facilitate existence, provide access to information and healthcare services. Assistive tools function as supports rather than replacements for my agency. Periodic care assistance enables me to manage those tasks I can still accomplish domestically. However, this remains viable only if I can remain in my home environment. (P4, Male)

Participants described a fundamental distinction between support that preserved autonomy and support that replaced it. Home care services, assistive technologies, and periodic family assistance were welcomed when they enabled continued residence in familiar environments and participation in valued activities. The same forms of support became sources of distress when they signalled loss of choice or marked a transition from subject to object.

The fear of institutionalisation pervaded narratives, representing not merely concern about quality of care but profound anxiety about total loss of control over the basic parameters of existence. Institutional placement was associated with loss of privacy, loss of routine autonomy, separation from meaningful social networks, and transformation into a managed recipient of standardised care.

My greatest apprehension concerns the eventual loss of physical capacity ... and the subsequent consequences. My children maintain employment obligations; state support remains inadequate. I pray we may age in place rather than face institutional relocation. (P5, Male)

Change itself does not fundamentally disturb me. What proves distressing is my diminishing capacity to respond effectively. The complexity of systems, navigating offices, understanding regulations, feels deliberately designed as barrier. This uncertainty robs me of my peace. (P13, Female)

The findings demonstrate that for older adults in Slovakia, sustainable ageing is inseparable from the capacity to remain in familiar environments with access to comprehensible, respectful support systems. Control is experienced not as complete independence but as the preservation of decisional authority over the fundamental parameters of daily life within the context of one's own home and community.

Discussion

The empirical findings reveal that subjective self-efficacy among older adults in Slovakia exists in a state of profound fragmentation, shaped fundamentally by the tension between personal competence and structural barriers embedded within institutional systems. This investigation provides empirical validation for the theoretical frameworks of critical social work and empowerment developed earlier in this chapter, demonstrating that sustainable ageing cannot be achieved through service provision alone but requires fundamental redistribution of power and transformation of systemic structures (Tanner et al., 2025; Lovrits & Kalenda Vávrová, 2025).

The fragmentation of autonomy observed in this study illuminates how ageism operates not through overt discrimination but through subtle systemic design that presumes incompetence and creates dependency. Participants in this study retained substantial competence in familiar domains yet were systematically excluded from institutional engagement through digital barriers, bureaucratic complexity, and inaccessible communication systems. This validates the critical social work position wherein ageism is understood as structurally embedded rather than individually situated (Previtali et al., 2022). The emphasis on digital inclusion in the National Programme for Active Ageing (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2021) thus emerges not merely as technical support but as a fundamental social justice imperative. Without accessible systems, older adults are effectively stripped of citizenship rights regardless of their cognitive or physical capabilities, a phenomenon

increasingly recognised in housing and service access literature (Quintía Pastrana, 2025).

The cognitive dimension of empowerment, as conceptualised by Kozubik et al. (2025) and Zhang et al. (2023), requires more than informational provision. It demands systemic transformation that genuinely recognises older adults as competent decision makers. When participants described their inability to navigate administrative procedures, access healthcare appointments, or understand legislative changes affecting their lives, they articulated how systems ostensibly designed to help can inadvertently undermine autonomy and create dependency. This finding validates the assertion that empowerment must address social structures maintaining inequality, not merely individual skills or deficits (Noordink et al., 2024; Stoykova, 2024). Kam (2023) emphasises that genuine empowerment requires establishing a ladder of user participation in social services, in which older adults move from passive recipients to active decision makers in service design and delivery.

The active resistance participants demonstrated through continued learning, productive contribution, and insistence on usefulness provides empirical evidence for the theoretical proposition that empowerment requires direct involvement of older adults in processes that strengthen their social and political identity (De Witte & Van Regenmortel, 2023). Participants' efforts to remain contemporary and contribute meaningfully represent what Noordink et al. (2024) term 'becoming powerful', wherein individuals and groups collectively assert their agency despite systemic pressures toward passivity. This resistance validates the strengths-based approach, where identifying and valuing older adults' skills and life experiences constitutes a fundamental step toward genuine empowerment (Crăciun, 2023).

However, this active pursuit of usefulness should not be romanticised as successful ageing but rather understood as a compensatory strategy within ageist systems. The National Programme's emphasis on active participation (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2021) must be implemented carefully to avoid what Repkova (2018) identifies as shifting responsibility from systemic support to individual effort. The findings suggest that older adults feel compelled to

demonstrate usefulness precisely because systemic structures threaten to redefine them as burdens rather than citizens with unconditional rights to dignity and support. Genuine empowerment would enable older adults to maintain dignity regardless of productive capacity, a principle embedded in frameworks emphasising dignity and respect as unconditional rather than performance contingent (Grigoraş et al., 2025; Moilanen et al., 2021).

The profound significance participants attached to remaining in their home environments provides empirical support for community-based approaches to sustainable ageing. Their equation of autonomy with ageing in place validates theoretical conceptualisations and demonstrates the practical implications of the system fragmentation characterising Slovak social services (Straughan et al., 2025; Buffel & Phillipson, 2024). Community networks provide essential support and identity maintenance; consequently, institutionalisation represents not merely residential relocation but fundamental disruption of the social fabric sustaining individual agency (Seifert & König, 2019). This finding validates community development approaches in which sustainability requires activating both environmental supports and internal community capacities (Šolcová & Holíková, 2023; Steiner et al., 2023).

Nevertheless, the results also reveal significant limitations of current community-based approaches in the Slovak context. Community development faces substantial structural barriers, including personnel shortages and financial instability (Rusnáková, 2020; Grundělková et al., 2022; Cangárová & Krupa, 2023). Participants' reliance on family members for bureaucratic navigation and their pronounced anxiety about future care availability demonstrate that without adequate systemic support, ageing in place risks becoming abandonment in place. This validates concerns regarding the system's preference for residential services (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2024) and the insufficient support for ambulatory and outreach services essential for home-based care.

The crucial distinction participants made between empowering and disempowering support illuminates core empowerment principles. Moilanen et al. (2021) demonstrate that older adults must retain control over decisions, experience dignity and

respect, and participate actively in determining support parameters to maintain perceived autonomy. Technology and care services function as instruments of power only when implemented collaboratively, rather than imposed paternalistically, a finding that resonates with broader research on participatory approaches in ageing policy (Lovrits & Kalenda Vávrová, 2025; Kam, 2023). This principle of collaborative implementation represents a conscious transfer of power from worker to client rather than merely provision of services or resources.

The relational component of empowerment emerges clearly in participants' narratives about professional identity and social recognition (De Witte & Van Regenmortel, 2023). The tension between internal competence and external perception, experienced particularly by those with professional backgrounds, demonstrates that self-efficacy is not solely individual but deeply embedded within social validation. When healthcare professionals, educators, or other experts find themselves positioned as incompetent recipients of care despite unchanged cognitive capabilities, the dissonance reveals how thoroughly ageism can penetrate even intimate relationships and family dynamics (Previtali et al., 2022). This challenges social workers to recognise and actively counter these dynamics in their practice, contributing to older people's well-being through what Tanner et al. (2025) describe as 'being that hopeful person' who genuinely believes in and supports older adults' capacities.

These findings hold significant implications for social work practice in Slovakia. The fragmentation of self-efficacy across domains suggests that interventions must address not only individual skills but the accessibility and design of institutional systems themselves. Social workers operating at the micro level can provide advocacy and navigation support. However, without mezzo- and macro-level interventions that transform bureaucratic processes, digital systems, and policy frameworks, such assistance merely compensates for structural failures rather than resolving them (Kozubik et al., 2025). Lovrits and Kalenda Vávrová (2025) argue that social workers must embrace their role as agents of transformative change, moving beyond accommodating existing inequitable structures to actively challenging and reshaping them.

The study confirms that sustainable ageing in Slovakia requires transformation from an assistance model, wherein services are provided to passive recipients, to a transformational model that genuinely redistributes power to older adults as active subjects. This empirical validation of critical social work theory demonstrates that without addressing structural ageism embedded in system design, communication practices, and institutional cultures, even well-intentioned reforms risk perpetuating dependency rather than enabling autonomy (Noordink et al., 2024; Stoykova, 2024; Kam, 2023). The path forward requires not merely expanding services but fundamentally reimagining how power, competence, and citizenship are understood and operationalised in relation to older adults.

Study Limitations

While this investigation provides valuable insights into subjective self-efficacy among older adults in Slovakia, several limitations warrant acknowledgment. First, the sample composition reflects certain characteristics that may limit generalisability. Participants were predominantly female (41 women, 10 men), actively engaged in Older Adults Social Clubs, and residing in urban or semi-urban environments. This profile suggests a population already demonstrating higher levels of social engagement and community participation than the broader older adult demographic in Slovakia. Older adults who are socially isolated, residing in rural areas, or living in institutional care settings – groups potentially experiencing lower self-efficacy – are not represented in this sample. Second, the snowball sampling technique, while appropriate for accessing authentic community networks, introduces potential selection bias toward individuals with stronger social connections and greater comfort engaging in group discussions. Third, the phenomenological approach, while enabling deep exploration of lived experience, captures subjective perceptions at a specific moment in time within particular societal and policy contexts. Longitudinal research would be necessary to understand how self-efficacy evolves in response to policy implementation or life transitions. Finally, while the study identifies fragmentation of autonomy and systemic barriers to empowerment, it cannot establish causal relationships between specific policy configurations and individual experiences of self-efficacy. Despite these limitations, the findings offer important insights into the gap between policy aspirations

and lived reality for older adults in Slovakia, providing an empirical foundation for future research and practice development.

Conclusion

This empirical investigation demonstrates that subjective self-efficacy among older adults in Slovakia exists in a state of profound fragmentation, shaped fundamentally by structural barriers rather than age-related decline. The findings reveal three interconnected dimensions of lived experience: fragmented autonomy where competence in familiar domestic spheres coexists with systematic exclusion from institutional engagement; proactive identity construction through which older adults actively resist ageist narratives of decline and dependency, despite encountering persistent structural barriers; and the centrality of home environments as essential spaces where autonomy and control can be maintained. These patterns validate the theoretical frameworks of critical social work and empowerment developed throughout this chapter, confirming that sustainable ageing cannot be achieved through service provision alone. Rather, it requires fundamental redistribution of power and transformation of systems that currently presume incompetence and create dependency. The fragmentation older adults experience is not an inevitable consequence of ageing but a product of how digital exclusion, bureaucratic complexity and inaccessible communication systems function as contemporary forms of structural ageism, effectively stripping competent individuals of their citizenship rights and agency.

For social work practice in Slovakia, these findings underscore an urgent imperative: the transition from assistance models to genuinely transformational approaches. While policy documents and legislative reforms gesture toward systemic change, older adults continue to experience themselves as objects of care rather than subjects with decisional authority. The crucial distinction participants drew between empowering support that enhances agency and disempowering assistance that replaces it provides clear direction for practice and policy reform. Interventions must preserve rather than usurp control, be implemented collaboratively rather than imposed paternalistically, and address structural barriers rather than merely compensating for them. As Slovakia faces rapid demographic ageing and embarks on major social

services reform, the pathway to sustainability becomes clear: systems should be built that recognise and enable the ongoing competence, contribution and citizenship of older adults within their chosen communities. This transformation represents not merely ethical necessity but economic and social imperative, as the future sustainability of Slovak society depends on maximising rather than marginalising the capacity and agency of its older citizens.

The empirical findings presented in this chapter raise a critical question that extends beyond the social dimensions examined here: how do individual experiences of disempowerment connect to the macro-level demographic, economic, and technological structures shaping ageing societies? The fragmented autonomy and digital exclusion documented in the self-efficacy investigation does not originate at the moment of retirement. Research on technostress in workplace settings suggests that the psychological relationship between older adults and digital technology is shaped long before they exit the labour market. Workers who experience sustained technostress during the final years of their careers are likely to enter retirement with accumulated negative associations toward digital systems, creating a life course continuum from workplace technostress to post retirement digital exclusion to fragmented consumer autonomy. This continuum represents a structural challenge that cannot be addressed through digital literacy training alone but requires coordinated intervention across the life course. Chapter 5 addresses these interconnections directly, providing comparative demographic evidence from the European Union, Slovakia, and Norway, examining how labour market participation, digital exclusion, and economic structures create the conditions within which the self-efficacy challenges documented here are either ameliorated or intensified.

The contribution of the presented monograph lies in two complementary levels. The first is the integrative level, within which we define an innovative and holistic view of sustainable ageing through the synthesis of knowledge anchored in ecosocial theory, while viewing the issue through the prism of environmental and digital justice. The second is the application level, where our empirical findings identify critical points and barriers in the broader ecosystem of ageing. This knowledge forms the basis for formulating specific systemic recommendations for public policy and social practice,

which aim to strengthen not only the individual self-efficacy of seniors, but especially their full-fledged participation in the digital and intergenerational society. The work thus goes beyond the framework of pure theoretical synthesis and offers a functional connection between the transdisciplinary model and the real needs of contemporary society.

5 Demographic, Digital, and Economic Foundations of Sustainable Ageing

This chapter examines the economic dimensions of population ageing, with a particular focus on how technological challenges and opportunities shape the participation of older adults in increasingly digital labour markets. It begins by exploring the macroeconomic implications of ageing societies, including effects on labour supply, productivity, and fiscal sustainability. It then considers healthcare and long-term care financing challenges, followed by an analysis of pension systems and retirement planning. Later sections focus specifically on the labour market participation of older adults, with a detailed examination of how technophobia and technostress create barriers to continued productive employment. Throughout the analysis, research conducted during the COVID-19 pandemic is highlighted, which accelerated workplace digitalisation while exposing significant disparities in technological adaptation capabilities among older workers.

5.1 Demographic Context of Population Ageing in Europe: Comparison of the EU-27, Slovakia and Norway

Population ageing represents one of the most profound structural transformations facing European societies in the 21st century. Its economic consequences for labour markets, pension systems, healthcare financing, and fiscal balance are far-reaching and interact with a range of technological, social, and institutional factors. This section situates the demographic context within which the economic analysis of the chapter unfolds, drawing on data for the EU-27, Slovakia, and Norway as the primary reference points.

Slovakia and Norway were selected as focal countries for this monograph because of the collaborative nature of this research, involving authors from both countries. Norway, a Nordic welfare state with high GDP per capita and comprehensive social protection systems, and Slovakia, a post-transition economy with a different welfare model and a legacy of rapid economic restructuring, offer complementary perspectives on the challenges and opportunities of ageing societies. Their juxtaposition

is analytically valuable precisely because their similarities in demographic trajectory coexist with profound differences in institutional capacity, welfare state architecture, and fiscal resilience, differences that shape how each country responds to the economic pressures of ageing.

Across Europe, the pace and scale of demographic ageing vary considerably by country, reflecting differences in historical fertility patterns, migration flows, and life expectancy trajectories. The EU-27 as a whole has entered a phase of sustained demographic maturation, characterised by a shrinking share of the working-age population and a steadily expanding elderly cohort. Within this broader European context, Central and Eastern European countries, including Slovakia, face a particularly challenging combination of rapid ageing, relatively lower per capita incomes, and welfare systems still adapting to the legacy of post-socialist transition. These structural constraints limit the fiscal space available for investing in active ageing policies, long-term care infrastructure, and digital inclusion programmes, precisely at a time when such investments are most urgently needed.

The analysis presented in this chapter proceeds in several steps. Sections 5.2 through 5.5 establish the empirical demographic foundation, examining key indicators for the EU-27, Slovakia, and Norway over the decade 2015–2024 and situating current trends within a longer historical perspective extending back to 1960. Section 5.6 examines the labour market participation of older adults, with particular attention to the barriers created by workplace digitalisation and technostress. Section 5.7 analyses digital exclusion as an economic challenge, linking the structural demographic pressures documented earlier in the chapter to the empirical findings on technostress and consumer behaviour presented in Chapter 6.

5.2 Key Demographic Indicators: EU-27, Slovakia and Norway (2015–2024)

Table 5.1 presents key demographic indicators for the EU-27, Slovakia, and Norway over the period 2015–2024, covering the share of population by age group, the ageing index, old-age dependency ratio, median age, and life expectancy by sex.

Table 5.1: Demographic Indicators – EU-27, Slovakia and Norway, 2015–2024

Indicator	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Share of population aged 0–14 (%)										
Population 0–14 (%) – EU-27	15.3	15.2	15.2	15.2	15.2	15.1	15.0	15.0	14.8	14.6
Population 0–14 (%) – Slovakia	15.3	15.3	15.5	15.6	15.7	15.8	15.9	16.1	16.1	16.0
Population 0–14 (%) – Norway	18.0	17.9	17.8	17.7	17.5	17.3	17.1	16.9	16.7	16.4
Share of population aged 65+ (%)										
Population 65+ (%) – EU-27	19.1	19.4	19.7	20.0	20.3	20.6	20.9	21.1	21.3	21.6
Population 65+ (%) – Slovakia	14.0	14.4	15.0	15.5	16.0	16.6	17.1	17.4	17.9	18.4
Population 65+ (%) – Norway	16.2	16.4	16.6	16.9	17.2	17.5	17.9	18.2	18.4	18.7
Ageing Index (persons aged 65+ per 100 persons aged 0–14)										
Ageing Index – EU-27	124.8	127.6	129.6	131.6	133.6	136.4	139.3	140.7	143.9	147.9
Ageing Index – Slovakia	91.5	94.1	96.8	99.4	101.9	105.1	107.5	108.1	111.2	115.0
Ageing Index – Norway	90.0	91.6	93.3	95.5	98.3	101.2	104.7	107.7	110.2	114.0
Old Age Dependency Ratio (persons aged 65+ per 100 persons aged 15–64)										
Old Age Dependency Ratio – EU-27	29.0	29.6	30.2	30.8	31.4	32.0	32.6	33.1	33.4	33.9
Old Age Dependency Ratio – Slovakia	19.7	20.6	21.5	22.5	23.5	24.5	25.5	26.1	27.0	27.9
Old Age Dependency Ratio – Norway	24.5	25.0	25.4	25.9	26.4	26.9	27.6	28.1	28.4	28.8
Median Age (years)										
Median Age (years) – EU-27	42.8	43.0	43.2	43.5	43.7	43.9	44.2	44.4	44.5	44.7
Median Age (years) – Slovakia	39.0	39.4	39.8	40.2	40.6	41.0	41.4	41.8	42.2	42.6

Median Age (years) – Norway	39.1	39.2	39.3	39.5	39.7	39.9	40.2	40.4	40.5	40.6
Life Expectancy at Birth – Males (years)										
Life Expectancy, Males – EU-27	77.7	78.0	78.1	78.2	78.5	77.5	77.2	77.9	78.7	79.2
Life Expectancy, Males – Slovakia	73.1	73.8	73.8	73.9	74.3	73.5	71.2	73.6	74.9	75.2
Life Expectancy, Males – Norway	80.5	80.7	81.0	81.1	81.3	81.6	81.7	80.9	81.5	81.7
Life Expectancy at Birth – Females (years)										
Life Expectancy, Females – EU-27	83.3	83.7	83.6	83.7	84.0	83.2	82.9	83.3	84.0	84.4
Life Expectancy, Females – Slovakia	80.2	80.7	80.7	80.8	81.2	80.4	78.2	80.5	81.5	81.9
Life Expectancy, Females – Norway	84.2	84.2	84.3	84.5	84.7	84.9	84.7	84.2	84.6	84.9

*Source: Own elaboration based on Eurostat database
(<https://ec.europa.eu/eurostat/data/database>). Slovakia 1960–2024 long run data supplemented
from datacube.statistics.sk.*

The data presented in Table 5.1 reveal a consistent pattern of demographic ageing across all three entities, yet with markedly different intensities and starting positions. Slovakia emerges as the most rapidly ageing of the three, having accelerated from a comparatively young age structure in 2015 to levels approaching the EU-27 average within less than a decade. The key findings summarised below highlight the most significant trends identified in the data and serve as a foundation for the detailed analysis presented in the sections that follow.

Table 5.2: Key Findings: Chapter 4 – Demographic Comparison EU-27, Slovakia and Norway 2015–2024

Key Findings: Chapter 4 – Demographic Comparison EU-27, Slovakia and Norway 2015–2024
• Slovakia's 65+ share grew at 2.4× the EU-27 rate between 2015 and 2024 (31.4% vs 13.1% relative growth). • Both Slovakia and Norway crossed the Ageing Index threshold of 100 around 2019–2020, despite very different historical trajectories.

- Slovakia's Old Age Dependency Ratio rose 41.6% vs only 16.9% for EU-27 – more than double the EU pace.
- Slovakia's working-age population (15–64) declined sharply from 70.7% to 65.7% in just 9 years; Norway's remained stable (65.8% → 64.9%).
- Male life expectancy in Slovakia (75.2 yrs, 2024) lags EU-27 by 4.0 years and Norway by 6.5 years.
- The COVID-19 pandemic caused a severe drop in Slovak male life expectancy: from 74.3 (2019) to 71.2 (2021).
- By 2060, Slovakia is projected to have 31.3% of its population aged 65+, with an Ageing Index of 215.9 – among the highest in Europe.

Source: Own elaboration, 2026.

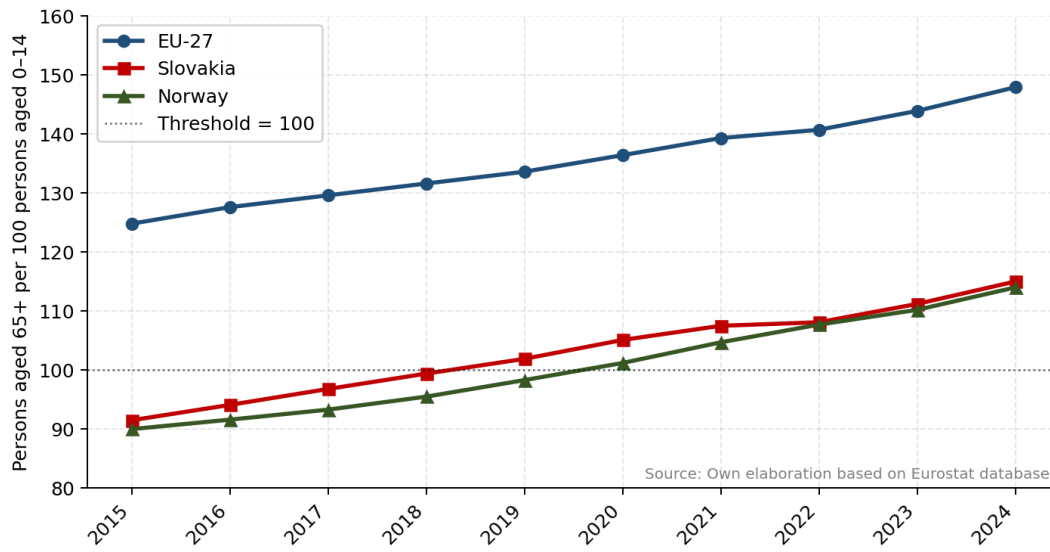
5.3 Analysis of Key Demographic Trends

Several important patterns emerge from the data presented in Table 4.1. In terms of the share of the population aged 65 and above, the EU-27 average increased from 19.1% in 2015 to 21.6% in 2024, representing a relative growth of 13.1%. Slovakia, which started from a considerably lower base (14.0% in 2015), experienced a substantially faster pace of ageing, reaching 18.4% by 2024 – a relative growth of 31.4%, approximately 2.4 times the EU-27 rate. Norway's share of the population aged 65+ increased from 16.2% to 18.7%, a relative growth of 15.4%, closer to the EU average pace.

For the younger population (aged 0–14), the EU-27 experienced a decline from 15.3% to 14.6%. Slovakia maintained a relatively stable or slightly increasing share (15.3–16.1%), while Norway saw a more pronounced decline from 18.0% to 16.4%, converging towards levels more typical of other European countries.

The ageing index reveals particularly striking dynamics. The EU-27 rose from 124.8 to 147.9. Both Slovakia and Norway started the period with ageing indices below 100, meaning both countries still had more young people than older people in 2015. By 2024, both crossed the symbolic threshold of 100, reaching 115.0 (Slovakia) and 114.0 (Norway), indicating that the older population now outnumbers the young population in both countries.

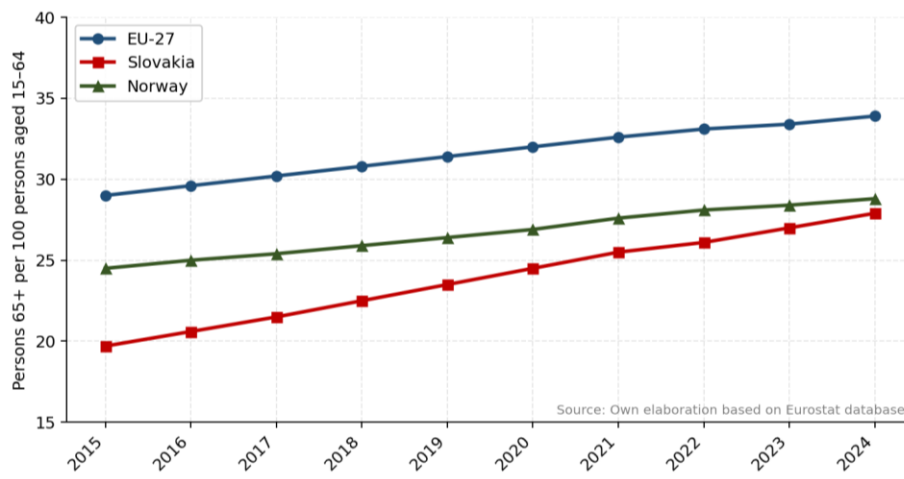
Figure 5.1: Ageing Index – EU-27, Slovakia and Norway, 2015–2024



Source: Own elaboration based on Eurostat (2024) [demo_pjan]. Retrieved from ec.europa.eu/Eurostat.

The old-age dependency ratio (persons aged 65+ per 100 persons aged 15–64) further illustrates the intensity of demographic change. The EU-27 ratio increased from 29.0 to 33.9 (a growth of 16.9%). Slovakia’s ratio rose from 19.7 to 27.9, representing a dramatic increase of 41.6%, more than double the EU-27 growth rate. This sharp increase reflects the combined effect of a rapidly growing older population and a shrinking working-age population.

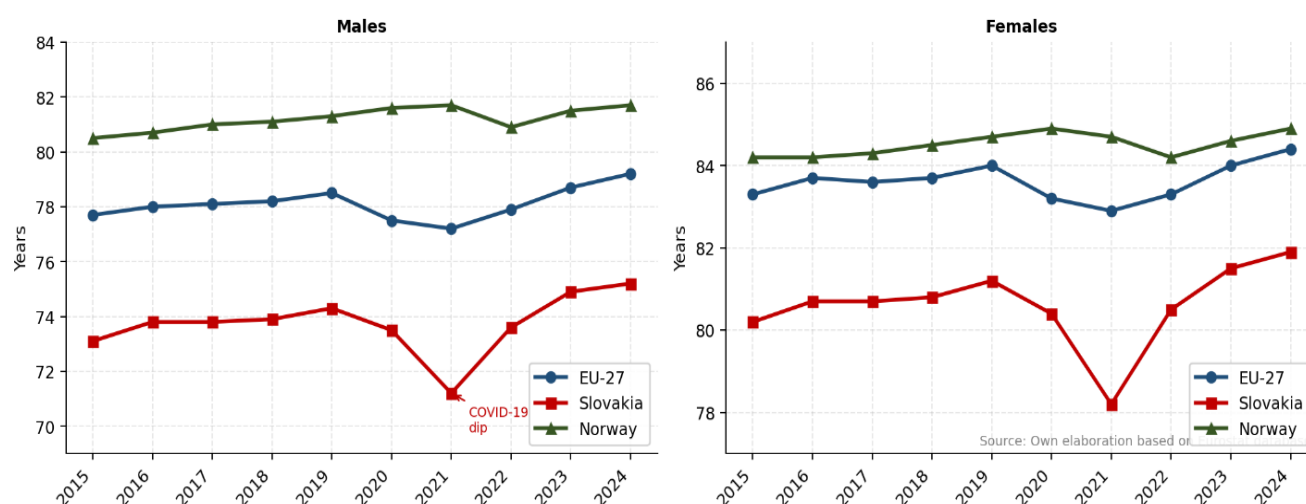
Figure 5.2: Old Age Dependency Ratio – EU-27, Slovakia and Norway, 2015–2024



Source: Own elaboration based on Eurostat (2024) [demo_pjan]. Retrieved from ec.europa.eu/Eurostat.

Life expectancy at birth reveals significant differences, particularly for males. In 2024, male life expectancy was 79.2 years in the EU-27, 81.7 years in Norway, and 75.2 years in Slovakia, a gap of 4.0 years between Slovakia and the EU average, and 6.5 years between Slovakia and Norway. The impact of the COVID-19 pandemic is clearly visible in the 2020–2021 data, with Slovakia experiencing a particularly severe decline in male life expectancy (from 74.3 years in 2019 to 71.2 years in 2021), while Norway's life expectancy remained more resilient.

Figure 5.3: Life Expectancy at Birth by Sex – EU-27, Slovakia and Norway, 2015–2024



Source: Own elaboration based on Eurostat (2024). *Demo_mlexpec*. Retrieved from ec.europa.eu/Eurostat.

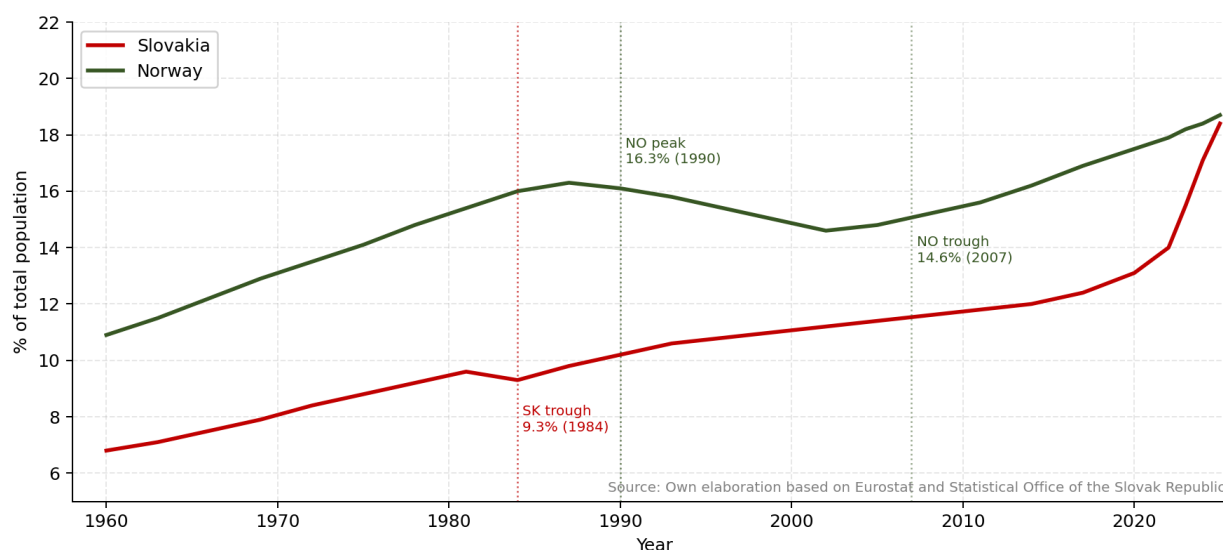
5.4 Long-Term Demographic Trajectories: Slovakia and Norway (1960–2024)

Demographic ageing in Slovakia is accompanied by a significant and growing fiscal challenge. Healthcare expenditure per capita, adjusted for purchasing power parity, increased by 56.8% in Slovakia between 2011 and 2021, substantially exceeding the EU-27 average growth rate over the same period (Eurostat, 2023). This trajectory reflects the combined pressure of a rapidly expanding older population, rising prevalence of chronic non-communicable diseases, and increasing costs of medical technology. Projections indicate that these pressures will intensify considerably as the large baby boom cohorts of the 1950s and 1960s enter advanced old age in the coming decades.

A longer historical perspective reveals fundamentally different demographic trajectories in Slovakia and Norway. In 1960, Slovakia had a significantly younger population, with only 6.8% aged 65+, compared to 10.9% in Norway. Norway's elderly share grew gradually and steadily, reaching a peak of approximately 16.3% around 1990 before experiencing a temporary plateau and even slight decline through the early 2000s, a phenomenon linked to the relatively small cohorts born during the Second World War entering old age. This unique pattern meant that Norway's share of the elderly population decreased from 16.3% in 1990 to 14.6% in 2007 before resuming its upward trajectory.

Slovakia's trajectory shows two distinct phases. From 1960 to approximately 1980, the elderly share grew slowly. Then, from the early 1980s to around 2000, Slovakia experienced a temporary decline or stagnation in the elderly share due to the entrance of smaller inter-war cohorts into old age. From approximately 2000 onwards, growth accelerated dramatically, driven by the ageing of the large baby boom cohorts born in the 1950s and 1960s, combined with sharply declining fertility rates after 1990. Between 2010 and 2024, Slovakia's elderly share grew from 12.4% to 18.4%, an increase of 6.0 percentage points in just 14 years.

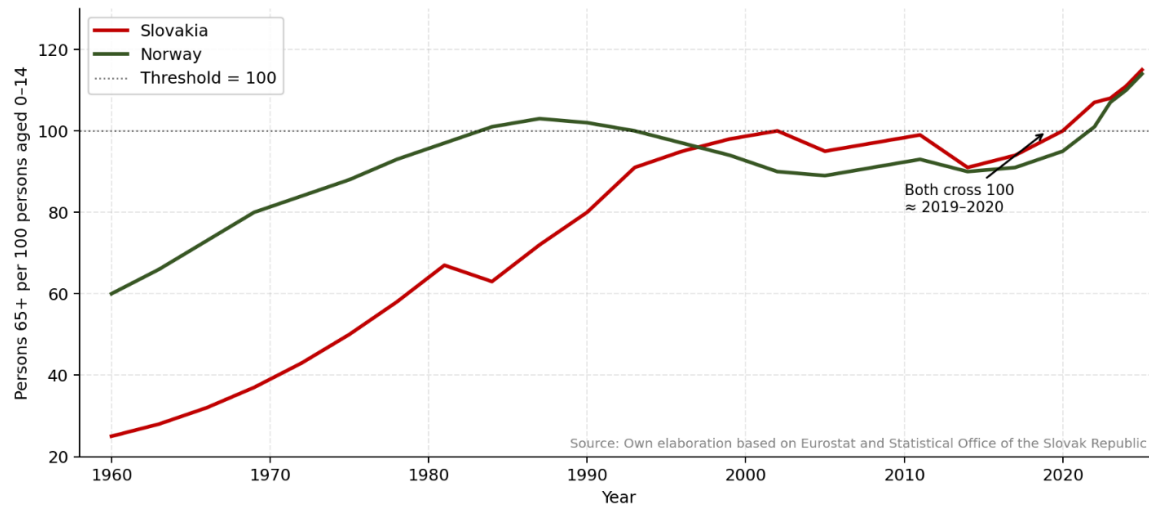
Figure 5.4: Share of Population Aged 65+ – Slovakia and Norway, 1960–2024



Source: Own elaboration based on Eurostat (2024); Statistical Office of the Slovak Republic (datacube.statistics.sk); Statistics Norway / SSB (2024).

A particularly notable finding is that both countries' ageing indices converged and crossed the 100 threshold at approximately the same time (around 2019–2020), despite their very different historical trajectories. This convergence illustrates how countries with different demographic histories can arrive at similar structural outcomes through different pathways.

Figure 5.5: Ageing Index – Slovakia and Norway, 1960–2024



Source: Own elaboration based on Eurostat (2024); Statistical Office of the Slovak Republic (datacube.statistics.sk); Statistics Norway / SSB (2024).

5.5 Age Structure Comparison and Future Projections

The current age structure of the two countries reflects their different demographic histories. Table 5.3 compares key age structure indicators for the EU-27 and Slovakia in 2015 and 2024, highlighting the pace of structural change.

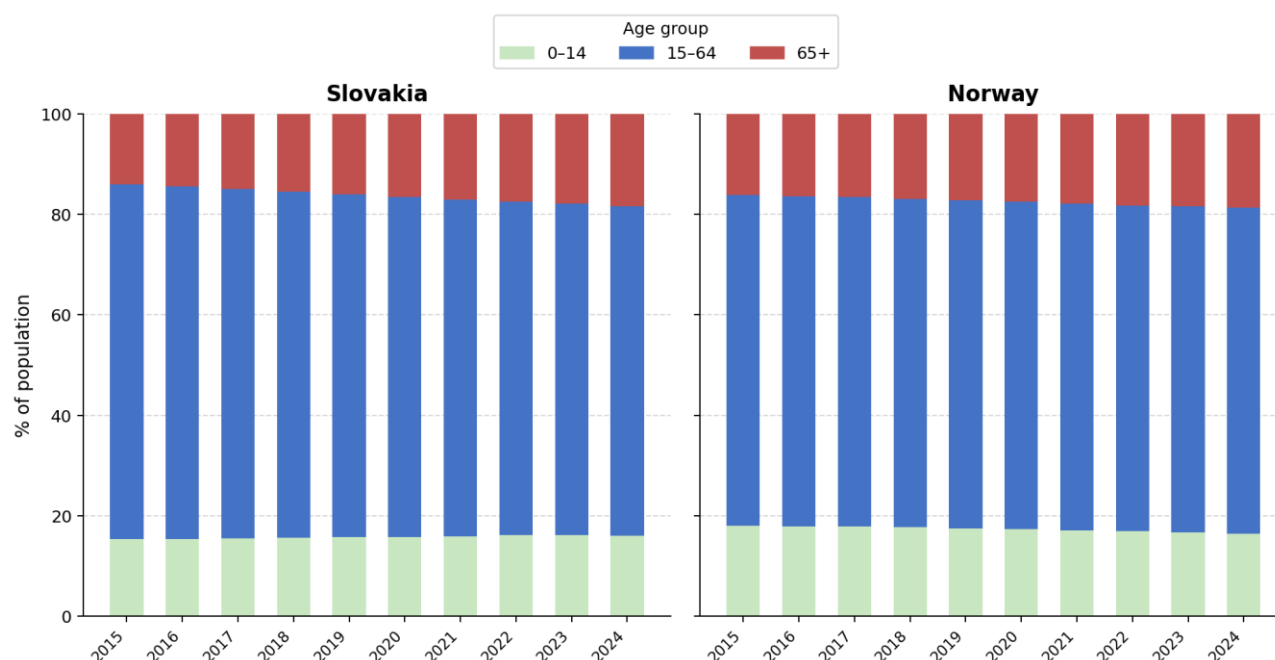
Table 5.3: Age Structure Comparison – EU-27 and Slovakia, 2015 and 2024

Indicator	EU-27 2015	EU-27 2024	Slovakia 2015	Slovakia 2024
Population aged 0–14 (%)	15.3	14.6	15.3	16.0
Population aged 15–64 (%)	65.6	63.8	70.7	65.7
Population aged 65+ (%)	19.1	21.6	14.0	18.4
Ageing Index	124.8	147.9	91.5	115.0
Old Age Dependency Ratio	29.0	33.9	19.7	27.9

Median Age (years)	42.8	44.7	39.0	42.6
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Source: Own elaboration based on Eurostat database. Note: Slovakia's working-age population (15–64) declined by 5.0 percentage points in 9 years – approximately 2.6× the EU-27 decline rate.

Figure 5.6: Age Structure Comparison – Slovakia and Norway, 2015–2024



Source: Own elaboration based on Eurostat (2024) [demo_pjan]. Retrieved from ec.europa.eu/Eurostat.

Looking ahead to 2060, Eurostat population projections paint a challenging picture. Table 5.4 presents the expected shares of the population aged 65+ and the corresponding ageing indices for selected European countries, with Slovakia and Norway highlighted.

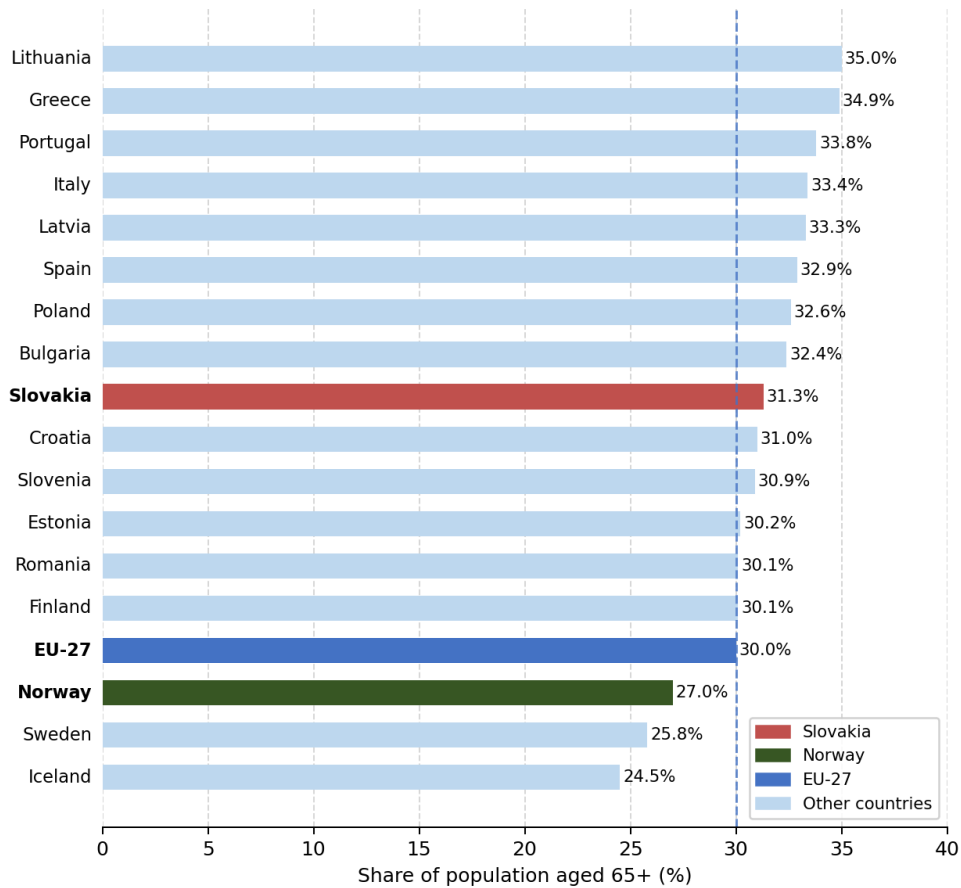
Table 5.4: Projected Share of Population Aged 65+ and 0–14, and Ageing Index in 2060 (selected European countries)

Country	65+ (%)	0–14 (%)	Ageing Index	Note
Lithuania	35.0	11.5	304.3	
Greece	34.9	12.2	286.1	
Portugal	33.8	12.0	281.7	
Italy	33.4	10.8	309.3	
Latvia	33.3	13.6	244.9	

Spain	32.9	11.4	288.6	
Poland	32.6	13.1	248.9	
Bulgaria	32.4	13.4	241.8	
Slovakia	31.3	14.5	215.9	↑ Rapid ageing pace
Croatia	31.0	12.0	258.3	
Slovenia	30.9	13.1	235.9	
Estonia	30.2	14.0	215.7	
Romania	30.1	14.1	213.5	
Finland	30.1	12.3	244.7	
EU-27	30.0	13.3	225.6	EU average
Switzerland	29.1	13.5	215.6	
Malta	29.0	11.2	258.9	
Austria	29.0	13.3	218.0	
Czechia	28.7	14.8	193.9	
Hungary	28.4	14.4	197.2	
France	28.2	15.0	188.0	
Germany	28.0	14.1	198.6	
Cyprus	27.6	13.6	202.9	
Ireland	27.3	14.3	190.9	
Denmark	27.0	14.5	186.2	
Norway	27.0	13.5	200.0	↑ Stronger fiscal buffer
Netherlands	26.9	13.8	194.9	
Belgium	26.7	14.3	186.7	
Luxembourg	26.3	13.7	192.0	
Sweden	25.8	15.5	166.5	
Iceland	24.5	14.3	171.3	

Source: Own elaboration based on Eurostat population projections (EUROPOP2023). Slovakia highlighted yellow; Norway highlighted green; EU-27 average highlighted blue.

Figure 5.7: Projected Share of Population Aged 65+ in 2060



Source: Own elaboration based on Eurostat EUROPOP2023 population projections. Retrieved from ec.europa.eu/Eurostat.

These demographic trends have profound economic implications. The shrinking working-age population and growing older population create what can be described as a ‘demographic scissors effect’, a dual pressure on labour markets, pension systems, and healthcare financing. In Slovakia, this effect is particularly acute due to the rapid pace of change, leaving less time for institutional adaptation compared to countries where ageing has unfolded more gradually. Norway, despite facing similar structural trends, benefits from a stronger fiscal position (including the Government Pension Fund) and a more developed active ageing policy infrastructure.

5.6 Labour Market Participation of Older Adults

As populations age across developed economies, extending productive working lives has become a critical economic imperative. Within this context, the ability of older

adults to maintain productive employment in increasingly digitalised workplaces has emerged as a key economic concern. The COVID-19 pandemic substantially accelerated workplace digitalisation and exposed significant vulnerabilities in labour markets worldwide. According to Seberíni , Nour, and Tokovská (2022), the pandemic turned the world of work upside down and had a dramatic effect on the livelihoods and well-being of workers, their families, and businesses worldwide, particularly small and medium-sized enterprises. The rapid transition to remote work and digital platforms revealed deep inequalities in digital readiness and technological adaptation capabilities among different worker populations, with older adults facing particular challenges.

The relationship between older worker employment and ageing sustainability is bidirectional. On the supply side, older adults who remain employed continue to contribute to pension and social insurance systems, generate income tax revenue, and maintain consumption that supports broader economic activity. On the demand side, employers who retain experienced older workers benefit from accumulated tacit knowledge, established client relationships, and valuable mentoring capacity, particularly in sectors facing acute skills shortages. Statistics Slovakia and Eurostat data confirm a significant employment gap: Norway's employment rate for workers aged 55–64 stood at approximately 68% in 2023, compared to the EU-27 average of 61% and Slovakia's 56%, reflecting fundamental differences in institutional design rather than workforce capability.

The transition to increasingly digitalised workplaces has complicated the employment prospects of older workers substantially. Research conducted by Seberíni , Tokovská, and Marasová (2023) demonstrates that technophobia and technostress have emerged as significant barriers to sustained workplace participation among older employees. Workers aged 55 and above were found to be significantly more likely to report difficulties with remote work technologies, experience technostress-related health consequences, and require longer adaptation periods than younger colleagues following the forced digitalisation of the COVID-19 period. These patterns have direct implications for pension system sustainability: workers who struggle during digital transitions may exit employment permanently and prematurely, simultaneously reducing their own retirement income and the fiscal base financing social insurance systems.

The gender dimension of older worker employment is particularly marked in Slovakia. Women's employment rates decline more sharply from age 50 onwards compared to men, partly reflecting the historically lower statutory retirement age for women with children, and partly due to the higher burden of caregiving responsibilities that interrupt employment trajectories in the critical late-career years, when pension entitlements are most rapidly accumulating. The ongoing legislative process equalising retirement ages represents an important step, but without complementary measures, including long-term care infrastructure that reduces informal caregiving demands, age-friendly workplace adaptations, and flexible work arrangements, formal equalisation risks imposing a legal change without the practical conditions to support it.

The relationship between educational attainment and older worker employment deserves particular attention as Slovakia navigates its demographic transition. Eurostat data consistently show that employment rates among workers aged 55 to 64 diverge sharply by educational level, with university-educated workers maintaining substantially higher participation rates into later working life than those with secondary or primary education. This educational gradient reflects multiple intersecting factors: physically demanding occupations that disproportionately employ lower-educated workers impose health costs that constrain extended working lives; cognitive and digital skills accumulated through higher education facilitate adaptation to changing workplace technology demands; and the intrinsic rewards of professional work may provide stronger motivation for continued employment than the extrinsic rewards available in lower-skilled occupations. The policy implication is that raising statutory retirement ages as a uniform measure will have profoundly unequal effects across the educational spectrum, extending working lives primarily for those already best positioned to continue working while creating hardship for those in physically demanding or low-skilled roles whose health and employment prospects are most constrained. Active ageing policy must therefore be differentiated by occupational category, addressing the specific barriers facing manual workers, care workers, and those in sectors undergoing rapid technological transformation, rather than treating extended employment as a universal goal achievable through uniform incentive structures.

5.7 Digital Exclusion as an Economic Challenge

The workplace has experienced significant transformation resulting from Information and Communication Technologies (ICTs) and subsequent digital shifts. As noted by Seberíni, Tokovská, and Marasová (2023), technophobia and technostress have emerged as significant barriers to workplace participation, with economic implications at both individual and societal levels. Digital exclusion represents not merely a social challenge but an economic threat that can prematurely remove valuable human capital from the labour market. This exclusion encompasses both unequal access to ICT and different abilities when using information and communication technologies considered essential for full participation in society, manifesting as a 'skills divide' that creates economic stratification based on digital competence (Van Dijk, 2012). The empirical evidence on technostress and consumer digital exclusion is presented in Chapter 6.

The economic costs of digital exclusion among older workers operate at multiple levels simultaneously. At the individual level, digitally excluded employees face reduced employability, limited access to remote work opportunities, exclusion from digital upskilling programmes, and heightened risk of premature involuntary exit from the labour market. Research by Moilanen et al. (2021) indicates that older workers who experience significant technostress are substantially more likely to consider early retirement as an escape from technologically demanding work environments, representing a direct fiscal cost through reduced contribution years and extended pension receipt. At the organisational level, age-based digital exclusion represents a loss of experienced human capital, accumulated knowledge, client relationships, and institutional memory, that cannot easily be replaced by younger, less experienced digital natives.

The concept of the 'digital divide' has evolved considerably since its original framing as a binary distinction between technology users and non-users. Van Dijk (2012) identifies four sequential barriers that produce digital exclusion: motivational access (the will to use digital technologies), physical access (availability of devices and connectivity), skills access (the competencies needed for effective use), and usage

access (the opportunities to apply digital skills in meaningful ways). For older workers, each of these barriers operates with particular intensity: motivational barriers are amplified by technostress and prior negative experiences; physical access may be constrained by workplace investment decisions; skills barriers reflect both educational history and the pace of technological change that outstrips adaptation capacity; and usage barriers arise when workplace digital tools are designed without older users in mind. Addressing digital exclusion among older workers therefore requires interventions at each barrier level, not merely the provision of devices or basic training.

The economic consequences of poor population health extend beyond direct healthcare costs. Behavioural risk factors, including smoking, alcohol consumption, physical inactivity, and poor diet, were estimated to account for more than 35% of the total disease burden in Slovakia in 2015, measured in disability-adjusted life years (IHME, 2016). Among children and adolescents, smoking prevalence in Slovakia exceeded the EU average, with 16% of boys and 18% of girls reporting smoking, compared to an EU average of 16% in both groups, indicating that the pipeline of future health-related workforce costs remains substantial (IHME, 2016).

The intersection of digital exclusion and ageing has become a critical policy concern in the context of Slovakia's compressed demographic transition. As documented in Chapter 5, Slovakia's working-age population declined by 5.0 percentage points in just nine years (2015–2024). In this context, the premature exit of digitally excluded older workers from the labour market creates a compounding fiscal pressure, simultaneously reducing labour supply and increasing pension and healthcare expenditure. The technostress survey presented in Chapter 6 provides empirical evidence of this risk in the Slovak and Polish context, while the consumer behaviour survey demonstrates its downstream consequences in post-retirement life. Taken together, these investigations support the conclusion that digital inclusion policy is not merely a social equity concern but a central component of Slovakia's economic sustainability strategy in an ageing society.

6 Integrated Systems for Sustainable Ageing

The complex challenges of population ageing require integrated approaches that transcend traditional disciplinary boundaries. Health, economic, and social dimensions of ageing constitute a single interconnected system: financial insecurity restricts access to preventive healthcare, poor health narrows labour market participation, and digital exclusion simultaneously limits access to healthcare services, financial tools, and community participation. Policies that treat these as separate domains address symptoms rather than causes.

This chapter examines three interconnected interfaces: health systems and economic structures (Section 6.1), economic policies and social outcomes (Section 6.2), and social work perspectives that mediate between individual experiences and systemic conditions (Section 6.3). Two empirical investigations, a technostress survey across Slovak and Polish enterprises and a consumer behaviour survey among 121 older adults in central Slovakia, demonstrate how pressures originating in one domain materialise as disadvantage in another, building on the demographic analysis of Chapter 5 and the qualitative findings of Chapter 4.

6.1 Health Economic Interfaces

The intersection of health and economic considerations represents a pivotal domain for sustainable ageing policies and programmes. As populations age globally, the integration of health economics into ageing research, policy formulation, and service delivery has transitioned from beneficial to essential. This interdisciplinary approach recognises that economic and health outcomes are inextricably linked, with interventions in one domain invariably affecting the other (Warren & Warren, 2023). A multidisciplinary perspective facilitates more comprehensive analysis of these complex relationships, incorporating insights from public health, gerontology, economics, and social sciences to develop more effective and sustainable solutions (Beard et al., 2016).

The economic case for preventive healthcare investment is particularly compelling in the Slovak context. Public health interventions targeting behavioural risk factors have demonstrated strong return on investment across multiple domains.

Evidence from OECD countries indicates that preventive measures addressing tobacco control, cardiovascular risk reduction, and immunisation programmes consistently yield favourable cost-effectiveness ratios relative to curative treatments (OECD/European Observatory on Health Systems and Policies, 2021). Slovakia's current allocation of approximately 0.05% of GDP to preventive care, compared to an evidence-based optimum estimated at 1.175% of gross national product (Wang & Wang, 2021), represents a substantial opportunity cost in terms of avoidable healthcare expenditure, lost productivity, and premature mortality.

The health economic interface encompasses multiple dimensions, including individual financial security, healthcare system sustainability, labour market participation, and macroeconomic impacts. Hanson et al. (2022) identify that innovative approaches to navigating these interfaces include value-based care models that align provider incentives with health outcomes, social impact bonds that finance preventive interventions through anticipated healthcare savings, and age-friendly economic policies that support extended labour force participation. These innovations share a common foundation in recognising the bidirectional relationship between economic well-being and health status throughout the life course (Cylus et al., 2019).

6.1.1 Cost-Effectiveness of Preventive Care

Preventive care embodies a critical leverage point within the health economic interface, offering opportunities to simultaneously improve health outcomes and enhance economic sustainability. Evidence increasingly demonstrates that targeted preventive interventions for ageing populations yield a significant return on investment through avoided healthcare costs, extended workforce participation, and reduced caregiving burden. Pinheiro et al. (2022) note that comprehensive economic analyses have documented favourable cost-effectiveness ratios for preventive measures, ranging from falls prevention programmes to cardiovascular risk reduction initiatives.

The structure of healthcare expenditure in Slovakia further illustrates the challenge. Among the Visegrád Four countries, Poland and the Czech Republic achieved better preventable mortality outcomes despite broadly comparable economic circumstances, with both countries allocating higher shares of total healthcare

expenditure to prevention (Eurostat, 2023). This cross-national comparison within a relatively homogeneous cultural and economic region provides compelling evidence that prevention investment levels, rather than structural or genetic factors, are a primary driver of the observed differences in population health outcomes.

Implementation science approaches have identified key factors that influence the real-world cost-effectiveness of preventive care, including intervention timing, targeting precision, delivery mechanisms, and contextual adaptation. For example, research indicates that multicomponent falls prevention programmes targeting high-risk older adults produce greater economic returns than universal screening approaches, demonstrating how precision targeting can optimise resource utilisation (Hopewell et al., 2018). Similarly, hypertension management initiatives leveraging community health workers and digital monitoring technologies have demonstrated superior cost-effectiveness compared to traditional clinic-based models in various settings across countries (Hayek et al., 2023; Hare et al., 2021). Innovation in preventive care economics increasingly focuses on creating sustainable financing mechanisms that accommodate the unique characteristics of preventive interventions, particularly their delayed return on investment. Novel approaches include shared savings arrangements that distribute downstream healthcare cost reductions among stakeholders, public–private partnerships that spread implementation costs across sectors, and revolving fund models that reinvest realised savings in expanded preventive programming. As Turner et al. (2023) describe, these innovations address the traditional misalignment between entities bearing preventive programme costs and those realising the economic benefits, creating more sustainable implementation pathways.

6.1.2 Economic Impact of Healthy Ageing

The economic implications of healthy ageing extend far beyond healthcare expenditures to encompass broader impacts on productivity, consumption patterns, fiscal sustainability, and intergenerational wealth transfers. Contrary to narratives that characterise population ageing primarily as an economic burden, multidisciplinary research demonstrates that healthy ageing can generate substantial economic opportunities through expanded silver economy markets, extended workforce

participation, and enhanced social capital contributions (World Health Organisation, 2025).

Labour market participation among older adults signifies a particularly significant economic dimension of healthy ageing. Research, as described by Klimczuk (2021), indicates that workplace accommodations, flexible employment policies, and age discrimination protections can facilitate continued productivity well beyond traditional retirement ages. The emergence of the silver economy, encompassing products, services, and markets oriented towards older adult consumers, reflects another domain where healthy ageing generates positive economic impacts. This sector has demonstrated resilience during economic downturns and significant growth potential across diverse markets, including healthcare technologies, adaptive housing, financial services, leisure, and tourism. Innovation ecosystems specifically supporting silver entrepreneurship foster business models that simultaneously enhance quality of life for older adults while creating economic value (Barković Bojanić, 2024).

Rigorous economic modelling incorporating multidisciplinary inputs has enabled a more comprehensive assessment of healthy ageing's macroeconomic impacts. These analyses demonstrate that improvements in functional capacity and extended health span can substantially mitigate the fiscal pressures associated with population ageing. For example, scenario analyses conducted for Australia's Intergenerational Report (2023) demonstrate that a 3% increase in healthy life expectancy could reduce projected age-related public expenditure growth by approximately 0.7 percentage points of GDP by 2060, illustrating the significant macroeconomic implications of seemingly modest health improvements.

6.1.3 Resource Allocation in Healthcare

Sustainable approaches to ageing necessitate evidence-informed resource allocation frameworks that optimise healthcare system impact while promoting equity and responding to evolving population needs. Traditional healthcare resource allocation models have often disadvantaged older populations through explicit or implicit age-based rationing, failing to recognise heterogeneity among older adults and the potential benefits of appropriate interventions across age groups. Contemporary approaches

increasingly incorporate multidisciplinary perspectives to develop more nuanced allocation frameworks that consider functional status, preference alignment, potential benefit, and equity considerations beyond chronological age (Beard et al., 2016).

Value-based healthcare models represent a promising innovation in resource allocation, shifting emphasis from service volume to achieved outcomes that matter to older adults (Ferri Sanz et al., 2025). These approaches prioritise interventions that maintain functional independence, support quality of life, and align with individual preferences, often diverging significantly from resource allocation patterns in traditional fee-for-service systems. Implementation of value-based models requires multidisciplinary collaboration to develop appropriate outcome measures, payment mechanisms, and delivery systems tailored to older populations' complex needs. Evidence from Commonwealth countries (e.g. Canada and the United Kingdom) suggests that such models have produced promising results, demonstrating improvements in both resource utilisation efficiency and patient-centred outcomes (Teisberg et al., 2020). Jiang, Li, and Zhang (2025) stress that digital innovation is transforming resource allocation processes through enhanced data analytics capabilities that enable more precise targeting and impact measurement. Predictive modelling algorithms incorporating social determinants data can identify high-risk individuals for preventive interventions, while continuous monitoring technologies facilitate more responsive resource allocation based on real-time needs assessment (Aldoseri, Al Khalifa, and Hamouda, 2024). These technological advances, when implemented with appropriate ethical safeguards and equity considerations, can substantially improve healthcare resource allocation efficiency while enhancing the personalisation of services for diverse older populations.

The health economic interfaces examined in this section, spanning preventive care financing, the macroeconomic value of healthy ageing, and evidence-informed resource allocation, provide the structural backdrop against which individual economic and social experiences unfold. Section 6.2 descends from this systemic level to examine how retirement systems, community economic development, financial security, and the specific pressures of workplace digitalisation shape the daily realities of ageing populations in Slovakia and Norway, demonstrating that the abstractions of health

economics become concrete in the lives of individuals navigating pension systems, consumer environments, and increasingly digitalised workplaces.

Community-based participatory approaches to resource allocation represent another innovative domain that enhances sustainability through greater responsiveness to local needs and priorities. Methods such as participatory budgeting, where community members directly influence healthcare spending decisions, have demonstrated success in multiple Commonwealth contexts, including rural India and urban United Kingdom settings. These approaches, as described by Buffel et al. (2021), recognise older adults as active participants rather than passive recipients in resource allocation processes, fostering more sustainable systems through enhanced community ownership and tailored resource distribution.

6.2 Economic and Social Connections

The relationship between economic systems and social outcomes in ageing societies is deeply bidirectional: economic policies shape social well-being, while social structures and individual psychosocial factors influence economic participation and productivity. This section examines these interconnections through three lenses – retirement systems, community economic development, and financial security drawing on evidence from the European context, with particular attention to Slovakia and Norway as examples of contrasting institutional approaches to the challenges of population ageing.

The social impact of inadequate preventive investment is distributed unequally across the Slovak population. Chronic non-communicable diseases, which account for the majority of preventable mortality in Slovakia, disproportionately affect lower socioeconomic groups, reinforcing cycles of health inequality and economic disadvantage (OECD/European Observatory on Health Systems and Policies, 2021). Cardiovascular diseases and malignant neoplasms together accounted for over 65% of all deaths in Slovakia in 2019, representing not only a public health failure but a significant source of premature labour market exit, increased dependency ratios and a growing demand for social support services among the surviving population (Ministry of Finance of the Slovak Republic & Ministry of Health of the Slovak Republic, 2019).

6.2.1 Social Impact of Retirement Systems

Retirement systems represent one of the most consequential institutional mechanisms shaping the social experience of ageing. Far beyond their primary function of providing income replacement, pension structures influence when and how individuals exit the labour market, affect social identity and self-worth, shape patterns of social participation, and determine the degree of autonomy and dignity available to older persons. The design of retirement systems thus has profound psychosocial consequences that extend well beyond their economic function.

The demographic pressures documented in Chapter 5, particularly the rapidly increasing old-age dependency ratios in countries such as Slovakia (rising from 19.7 to 27.9 per 100 working-age persons between 2015 and 2024), have compelled governments across Europe to undertake pension reforms aimed at extending working lives and ensuring fiscal sustainability. These reforms typically include raising statutory retirement ages, restricting early retirement pathways, and introducing or strengthening funded pension pillars. However, the social consequences of such reforms are complex and unevenly distributed across different population groups.

In Slovakia, the pension system has undergone substantial transformation since the 2000s. The country shifted from a monolithic pay-as-you-go system inherited from the socialist era to a multi-pillar model, introducing a mandatory funded second pillar in 2005 and gradually increasing the statutory retirement age. Historically, Slovakia maintained different retirement ages for men and women, with women's retirement age determined by the number of children they had raised, a policy reflecting traditional gender roles that created cohort-specific effects on labour market participation patterns. Recent reforms have been gradually equalising retirement ages for men and women, though legacy effects remain visible in current employment patterns, particularly in the 60–64 age cohort, where the gender gap in employment rates is most pronounced (Seberíni, Nour, and Tokovská, 2022).

Norway, by contrast, implemented a comprehensive pension reform in 2011 that introduced flexible retirement from the age of 62 with actuarial adjustments, allowing individuals to combine work and pension income without reduction. This approach

reflects a fundamentally different philosophy, rather than imposing rigid retirement thresholds, it enables gradual transitions that can be adapted to individual health status, occupational demands, and personal preferences. Norway's Government Pension Fund (often referred to as the 'oil fund') further provides a fiscal buffer that enables more generous social protection, reducing the pressure to cut pension benefits in response to demographic change (OECD, 2023).

From a psychosocial perspective, the transition from employment to retirement represents one of the most significant life-course changes, affecting identity, social networks, daily routines, and sense of purpose. Research consistently demonstrates that involuntary or abrupt retirement is associated with increased risk of depression, cognitive decline, and social isolation (Wang & Shi, 2014). Conversely, gradual retirement transitions that allow individuals to maintain meaningful work engagement, whether through part-time employment, mentoring roles, or bridge employment, are associated with better psychological adjustment and sustained well-being. The availability of flexible retirement pathways is therefore not merely an economic policy question but also a matter of psychosocial health.

The social impact of retirement systems is further shaped by educational attainment. Workers with lower educational qualifications typically accumulate shorter contribution periods, earn lower wages throughout their careers, and consequently receive lower pension benefits. These individuals are also more likely to work in physically demanding occupations that limit their capacity for extended working lives, creating a fundamental tension between pension reforms that raise retirement ages and the lived realities of workers in manual and low-skilled occupations. Educational disparities in employment rates widen dramatically with age, from relatively modest differences in the 55–59 age group to substantial gaps among workers aged 70–74, where continued employment is predominantly a phenomenon of the highly educated professional class (Eurostat, 2024). This cumulative disadvantage pattern underscores the need for retirement systems that are sensitive to occupational heterogeneity and educational stratification.

6.2.2 Community Economic Development

Population ageing transforms not only national economic structures but also the economic fabric of local communities. The concept of the 'silver economy', encompassing economic activities, products, and services that serve the needs and preferences of people over 50, has increasingly gained recognition as a significant driver of community economic development. Rather than viewing ageing populations as an economic burden, this perspective recognises older adults as consumers, producers, volunteers, caregivers, and entrepreneurs who generate substantial economic value within their communities (Barković Bojanić, 2024).

At the community level, the economic contributions of older adults extend beyond formal employment. Informal caregiving, for grandchildren, spouses, and other family members, represents a massive, largely invisible economic contribution that enables younger generations to participate in the labour market. Volunteering by older adults contributes to social services, cultural institutions, and community organisations, substituting for paid labour and generating social capital that underpins community resilience. Estimates suggest that the economic value of informal caregiving and volunteering by older adults in the EU runs into hundreds of billions of euros annually, yet these contributions remain largely unrecognised in conventional economic accounting (UNECE, 2022).

Norway offers instructive examples of age-friendly community economic development. Norwegian municipalities have implemented strategies that integrate age-friendly urban design with local economic development, creating environments that support both the economic participation and the well-being of older residents. The Norwegian Association of Local and Regional Authorities (KS) has documented good practices in developing age-friendly communities that promote intergenerational economic activities, support local entrepreneurship by and for older adults, and adapt public services to the needs of an ageing population (KS, 2019). These initiatives recognise that community economic development in ageing societies requires deliberate attention to accessibility, digital inclusion, and the creation of social spaces that facilitate both economic and social participation.

In Slovakia, the rapid pace of demographic ageing, with the old-age dependency ratio projected to continue rising sharply in the coming decades, presents both challenges and opportunities for community economic development. The country's National Programme for Active Ageing 2021–2030 recognises the importance of supporting older adults' economic participation and social engagement at the community level. However, significant regional disparities persist, with rural communities often facing simultaneous challenges of population ageing and economic decline, creating a compounded vulnerability that requires targeted policy interventions (Ministry of Labour, Social Affairs and Family of the Slovak Republic, 2021). The digital divide, as documented by Seberíni , Tokovská, and Marasová (2023), represents a particularly significant barrier to community economic participation for older adults, as technophobia and technostress limit their ability to engage in increasingly digitalised economic activities.

The UNECE Standing Working Group on Ageing has emphasised the importance of connecting ageing policies with sustainable development at the community level, advocating for the development of age-friendly economic environments that promote both intergenerational solidarity and the economic participation of older adults (UNECE, 2023). This approach aligns with the Madrid International Plan of Action on Ageing, which emphasises the creation of enabling environments that support the full participation of older persons in social, economic, and cultural life.

6.2.3 Financial Security and Well-Being

Financial security in later life represents a critical intersection of economic circumstances and psychological well-being, where objective material conditions and subjective perceptions of security jointly determine quality of life. Research consistently demonstrates that financial insecurity in old age is associated not only with material deprivation but also with elevated levels of anxiety, depression, reduced sense of control, and diminished life satisfaction (Lusardi & Mitchell, 2014). These psychosocial consequences of financial insecurity create a feedback loop: poor mental health further limits economic participation and the capacity to manage financial resources effectively, deepening vulnerability.

The gender dimension of financial security in old age deserves particular attention. Women across Europe face systematically higher risks of poverty and material deprivation in later life, reflecting the cumulative effects of gender pay gaps, career interruptions for caregiving, and shorter contribution periods to pension systems. While countries such as Slovakia demonstrate relatively small gender gaps in older worker employment rates, partly a legacy of socialist-era institutions that promoted universal female labour-force participation, these favourable employment patterns do not necessarily translate into financial equity, as gender pay gaps persist and women's pension entitlements remain lower on average (Eurostat, 2023). Norway, despite being a leader in gender equality policies, still observes gender differences in pension income, though to a lesser extent than most European countries, owing to redistributive elements in its pension system and strong public services that reduce the financial burden of care (OECD, 2023).

Financial literacy and the capacity to navigate increasingly complex financial products and digital financial services represent emerging determinants of financial security in old age. As pension systems shift towards defined contribution models that place greater responsibility on individuals for investment decisions, financial literacy becomes critical for ensuring adequate retirement income. Yet research indicates that financial literacy declines with age, and older adults are disproportionately affected by digital exclusion from financial services (Lusardi & Mitchell, 2014). This creates a particularly challenging dynamic in post-transition economies such as Slovakia, where multi-pillar pension systems require individual financial decision-making skills that many current retirees were not equipped with during their working years under centrally planned systems.

The life expectancy data presented in Chapter 4 add an important dimension to the discussion of financial security. The significant gap in male life expectancy between Slovakia (75.2 years in 2024) and Norway (81.7 years) translates directly into different retirement durations and therefore different demands on pension savings and public pension systems. Moreover, the severe impact of the COVID-19 pandemic on Slovak life expectancy, with male life expectancy dropping to 71.2 years in 2021, exposed the

vulnerability of population health in contexts where lower socioeconomic status and limited access to quality healthcare intersect with demographic ageing.

An integrated approach to financial security and well-being in later life must therefore address multiple dimensions simultaneously: ensuring adequate pension income through sustainable and equitable pension systems; promoting financial literacy and access to financial services, including digital financial tools; supporting continued economic participation through age-friendly labour markets and flexible working arrangements; and addressing the psychosocial dimensions of financial security, including the anxiety, loss of autonomy, and social exclusion that accompany financial insecurity. As Seberíni, Tokovská, and Marasová (2023) emphasise, the digital transformation of financial services creates both opportunities for improved access and risks of exclusion for those experiencing technophobia or lacking the necessary digital skills, making digital inclusion a prerequisite for financial security in an increasingly digitalised economic environment.

6.2.4 Technostress in the Digital Workplace: Evidence from Slovakia and Poland

Technostress, stress arising from the adoption and use of digital technologies, represents a growing occupational health challenge with direct implications for sustainable ageing in the workforce. The following section presents empirical evidence from a quantitative survey study conducted across selected enterprises in Slovakia and Poland in 2025 (Kaššayová, 2025).

Research Design and Sample

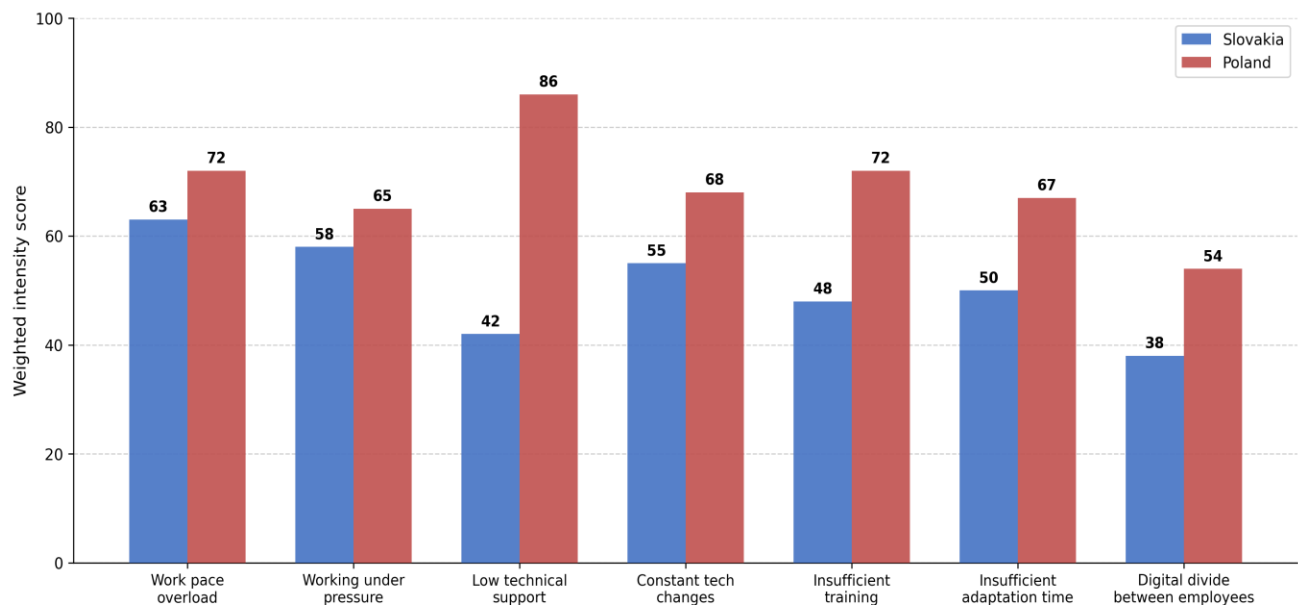
The study employed a quantitative survey methodology, distributing identical questionnaires (in Slovak and Polish) to employees at three internationally operating companies. Data were collected in Slovakia in February 2025 (Bratislava, Žilina, and Košice) and in Poland in January 2025 (Warsaw, Wrocław, and Poznań). Of 120 potential respondents, 77 completed the questionnaire fully (response rate 64.2%): 38 from Slovakia (55.3% women, 44.7% men) and 39 from Poland (51.3% women, 48.7% men). All respondents worked with ICTs for a minimum of five hours daily. Neither sample included employees aged 55 or older, reflecting the younger workforce profile of

the surveyed enterprises; however, the findings carry implications for ageing workforce policy as digital demands intensify across all age groups.

Key Stressors and Their Perceived Impact

The survey examined seven key technostress stressors: work pace overload, working under pressure, low levels of technical support, constant technological changes, insufficient training and support, insufficient time for adaptation, and the digital divide between employees. Polish respondents consistently reported higher stressor intensity across all seven dimensions. The most pronounced cross-national difference was in low technical support (Polish employees registered intensity scores 44 weighted points higher). In Slovakia, work pace overload and working under pressure were dominant, with 24 respondents (63.2%) rating their combined impact as high or very high.

Figure 6.1: Technostress Stressors in Slovak and Polish Enterprises (weighted intensity scores)



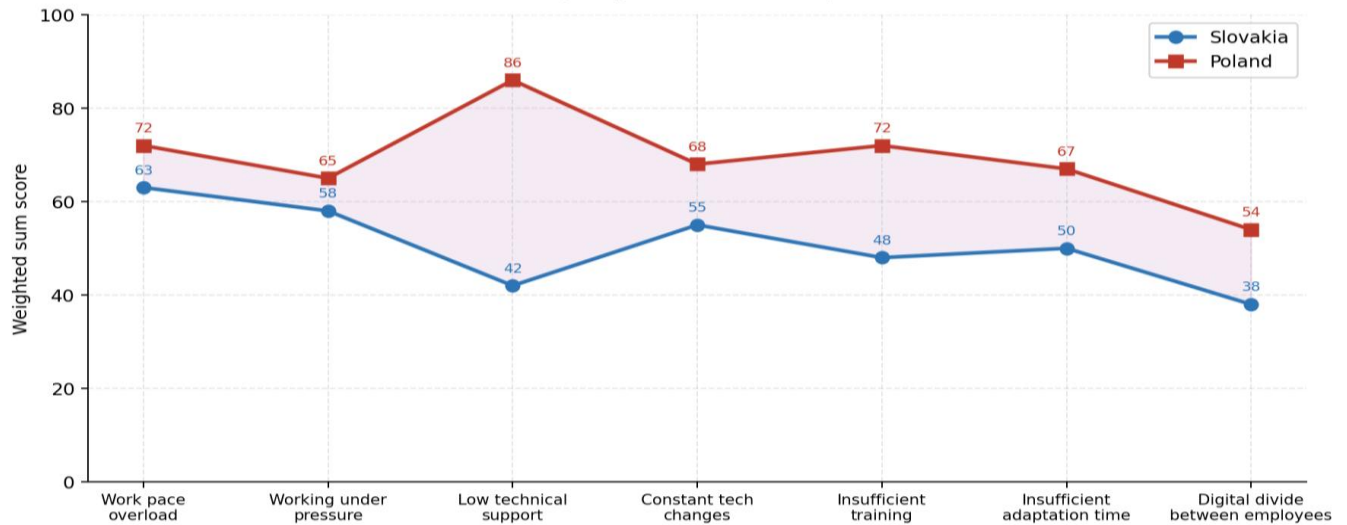
Source: Kaššayová (2025), own processing. n = 77 enterprises (SK+PL).

Effects on Work Performance

Reduced concentration was the most frequently reported consequence in both Slovakia (44.7%) and Poland (51.3%). A notable cross-national divergence emerged with respect to reduced work efficiency: while only 28.9% of Slovak respondents

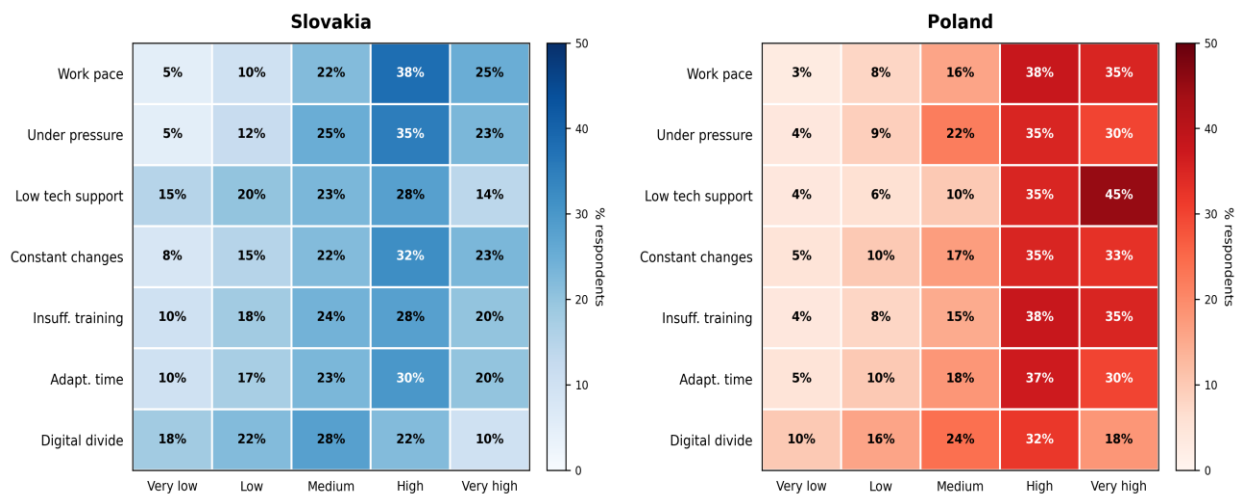
reported this impact, as many as 53.8% of Polish respondents reported diminished efficiency. These findings suggest that Polish workers are more acutely aware of the organisational costs of technostress.

Figure 6.2: Intensity of Stressor Perception – Slovakia vs. Poland



Source: Own processing, 2025.

Figure 6.3: Distribution of Technostress Stressor Perception by Impact Level (%)



Source: Own processing, 2025.

Table 6.1: Comparison of Key Findings – Slovakia vs. Poland (Technostress Survey, 2025)

Factor	Slovakia	Poland	Implications for Ageing Policy
Dominant sector	Finance & banking (36.8%)	IT & software dev. (35.9%)	Tailor sector specific digital health interventions
Age distribution (modal)	35–44 years (34.2%)	Under 25 years (46.2%)	Intergenerational cooperation programmes in Slovak enterprises
Primary stressors	Work pace overload, pressure	Work pace overload, insufficient training	Differentiated technostress management strategies per country
Reduced concentration	44.7%	51.3%	Both countries: awareness & ergonomic interventions needed
Reduced work efficiency	28.9%	53.8%	Urgent prevention in Poland; awareness raising in Slovakia
AI reducing stress	23.7% report reduction	30.8% report reduction	Promote age inclusive AI tools; dual nature of technology
Effective prevention measures	28.9% of enterprises	30.8% of enterprises	Substantial gap; scale effective models across both countries

Source: Kaššayová (2025), own processing.

Implications for Sustainable Ageing

These findings carry significant implications for sustainable ageing policy. First, the prevalence of technostress, even among relatively young and IT-proficient workers, signals that as current workforces age, accumulated exposure to digital stressors may translate into earlier workforce exit and higher rates of occupational burnout among older employees. Second, only approximately 29–31% of surveyed enterprises have effective technostress prevention measures in place, representing a substantial gap. Third, AI as a potential stress-reducing tool (acknowledged by 23.7% of Slovak and

30.8% of Polish respondents) underscores the dual nature of digital technology as both stressor and resource.

6.2.5 Consumer Behaviour and Digital Exclusion Among Older Adults: Evidence from a Regional Survey in Central Slovakia

Consumer behaviour represents a critical yet often overlooked dimension of sustainable ageing, as the capacity to independently access goods and services directly affects autonomy, well-being, and social participation (Guido et al., 2022; Solomon et al., 2019). The growing digitalisation of retail and service environments may simultaneously create new barriers for older adults who lack digital literacy or face age-related functional limitations (Mubarak & Suomi, 2022). To provide empirical grounding for these theoretical concerns, a quantitative survey was conducted among 121 older adults (aged 60+) in the Banská Bystrica region of central Slovakia.

Research Design and Methodology

The study employed a cross-sectional quantitative design using a standardised questionnaire administered through mixed-mode data collection: electronically via Google Forms (n = 12, 10%) and in paper format through personal distribution (n = 35, 29%) and at two day centres for older adults, Harmony (n = 45, 37%) and Hope (n = 29, 24%). This mixed-mode approach was deliberately chosen to reduce selection bias that would arise from exclusively online data collection. The final sample comprised 121 respondents stratified into five age cohorts (Table 6.2). Data analysis employed chi-square tests, Kruskal–Wallis H tests, and Spearman rank correlations. Statistical significance was set at $\alpha = 0.05$.

Table 6.2: Sample Description by Age Group and Gender – Consumer Survey

	60–65	66–70	71–75	76–80	81+	Total
Male	8	11	8	10	7	44
Female	15	13	20	14	15	77
Total	23	24	28	24	22	121
% of sample	19.0%	19.8%	23.2%	19.8%	18.2%	100%

Source: Own survey, 2025. $n = 121$. Gender distribution: 77 women (63.6%), 44 men (36.4%).

Digital Exclusion and Technology Adoption

The relationship between age and internet usage exhibited a statistically significant association ($\chi^2(8) = 27.43$, $p < 0.001$, Cramér's $V = 0.34$), confirming a strong age-dependent pattern of digital exclusion. Table 6.3 presents the age-by-cohort digital exclusion pattern.

Table 6.3: Digital Exclusion by Age Cohort

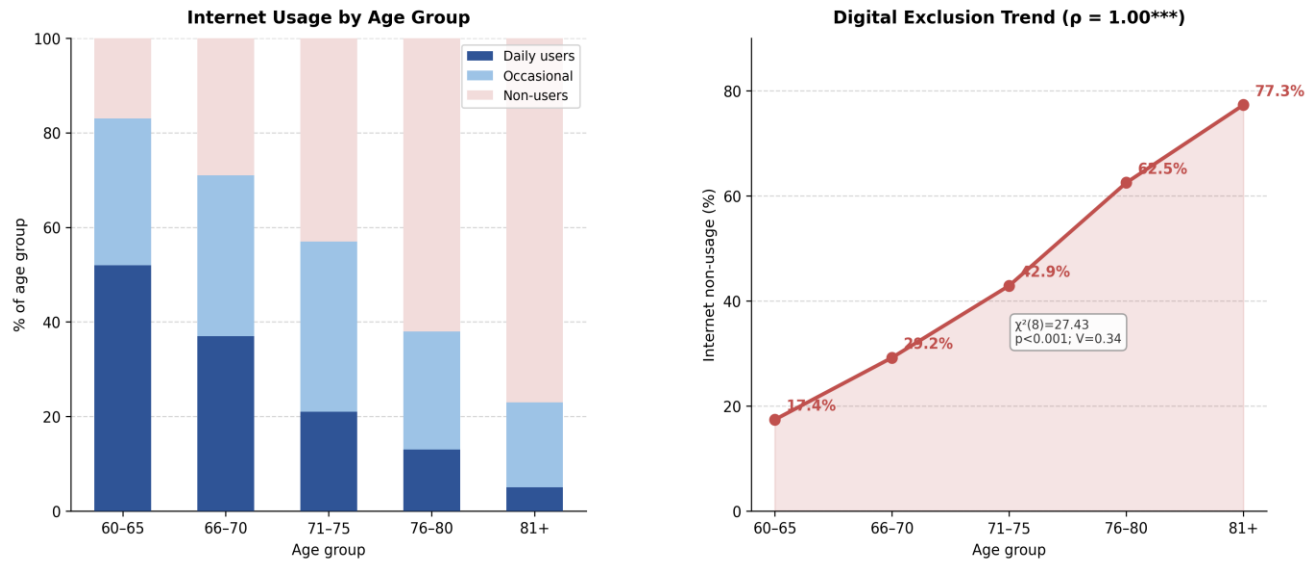
Age cohort	N	Internet non usage (%)	Never shop online (%)	χ^2 / Spearman result
60–65	23	17.4%	~52%	Lowest exclusion
66–70	24	~30%	~60%	Moderate
71–75	28	~50%	~68%	Above average
76–80	24	~65%	~74%	High
81+	22	77.3%	~85%	Highest exclusion
TOTAL	121	~52.1%	67.8%	$\chi^2(8) = 27.43$, $p < 0.001$, $V = 0.34$; Spearman $\rho = 1.00$ (cohort level)

Source: Own survey, 2025. Note: Spearman $\rho = 1.00$ reflects a perfect monotonic rank-order association across the five age group medians at the cohort level, not at the level of individual respondents. This is consistent with highly structured, age-stratified data and does not imply absence of within cohort variation.

Online shopping adoption was minimal across all age groups, with 67.8% of respondents reporting they never purchase goods online. Only 6.6% reported regular online shopping activity ($\chi^2(8) = 18.89$, $p = 0.015$, $V = 0.28$). Notably, no respondent

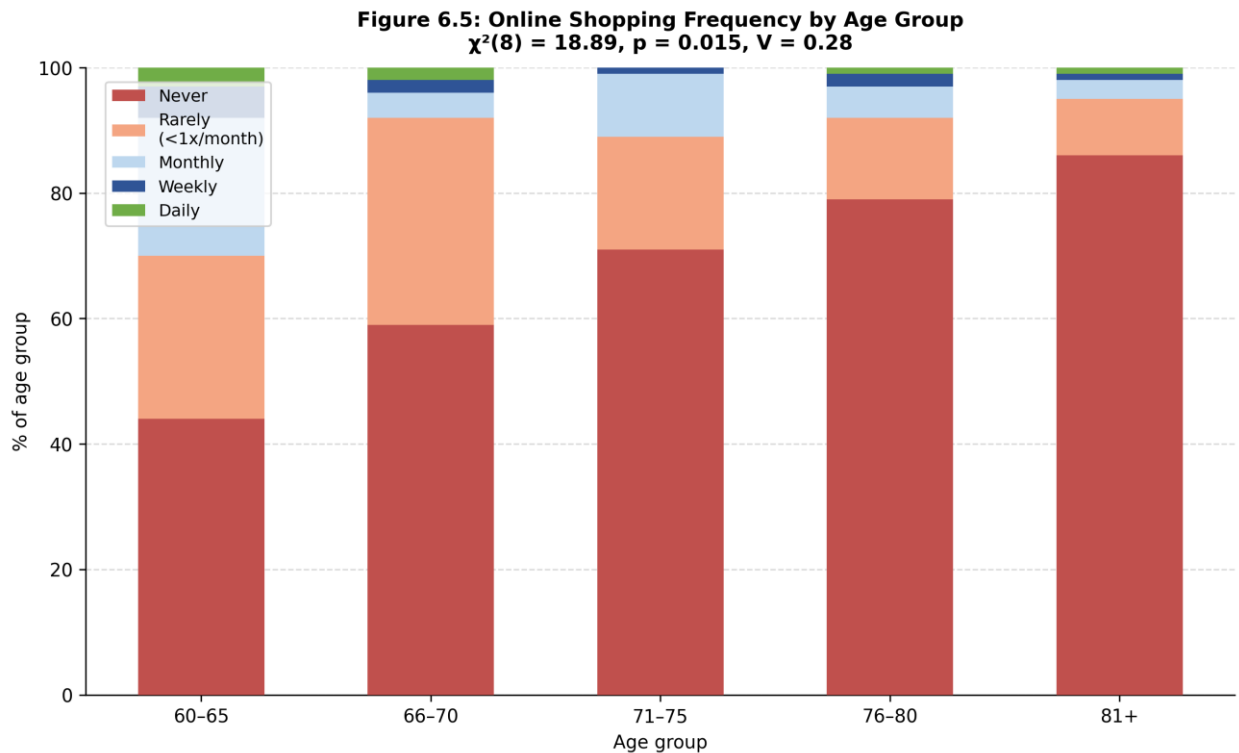
reported purchasing groceries online, indicating that food shopping remains exclusively an in-person activity for this population.

Figure 6.4: Internet Usage Patterns by Age Group and Digital Exclusion Trend



Source: Own survey, 2025.

Figure 6.5: Online Shopping Frequency by Age Group



Source: Own survey, 2025.

Purchase Decision Factors

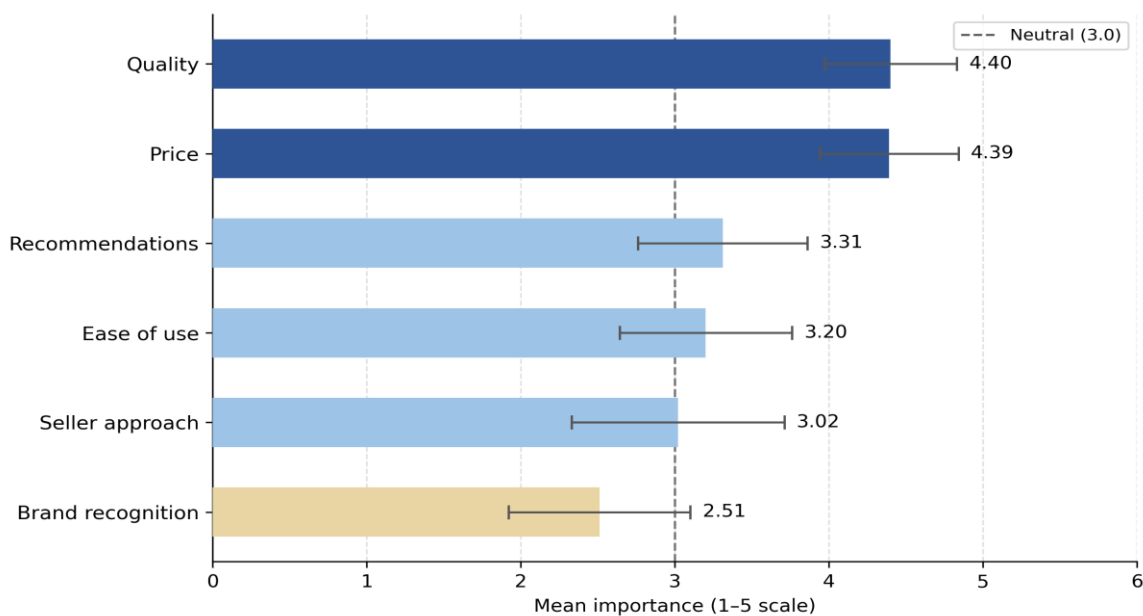
Table 6.4: Purchase Decision Factor Ratings (n = 121)

Factor	Mean	Median	SD	% rating 4–5	Rank
Quality	4.40	5.0	0.85	89.3%	1
Price	4.39	5.0	0.89	85.9%	2
Recommendations	3.31	3.0	1.10	45.5%	3
Ease of use	3.20	3.0	1.12	38.0%	4
Seller approach	3.02	3.0	1.38	39.7%	5
Brand recognition	2.51	2.0	1.18	24.8%	6

Source: Own survey, 2025. Scale: 1 = not important, 5 = very important.

Quality (M = 4.40) and price (M = 4.39) emerged as the dominant decision criteria. Brand recognition was rated as the least important factor (M = 2.51), challenging conventional assumptions about brand loyalty among older consumers (cf. Patterson, 2007) and reflecting economic realities documented in Chapter 5, where the majority of respondents depend solely on retirement pensions.

Figure 6.6: Purchase Factor Importance Ratings (mean ± SD)



Source: Own survey, 2025. Scale: 1 = not important, 5 = very important.

Source: Own survey, 2025. n = 121. Scale: 1 = not important, 5 = very important.

Shopping Barriers and Environmental Accessibility

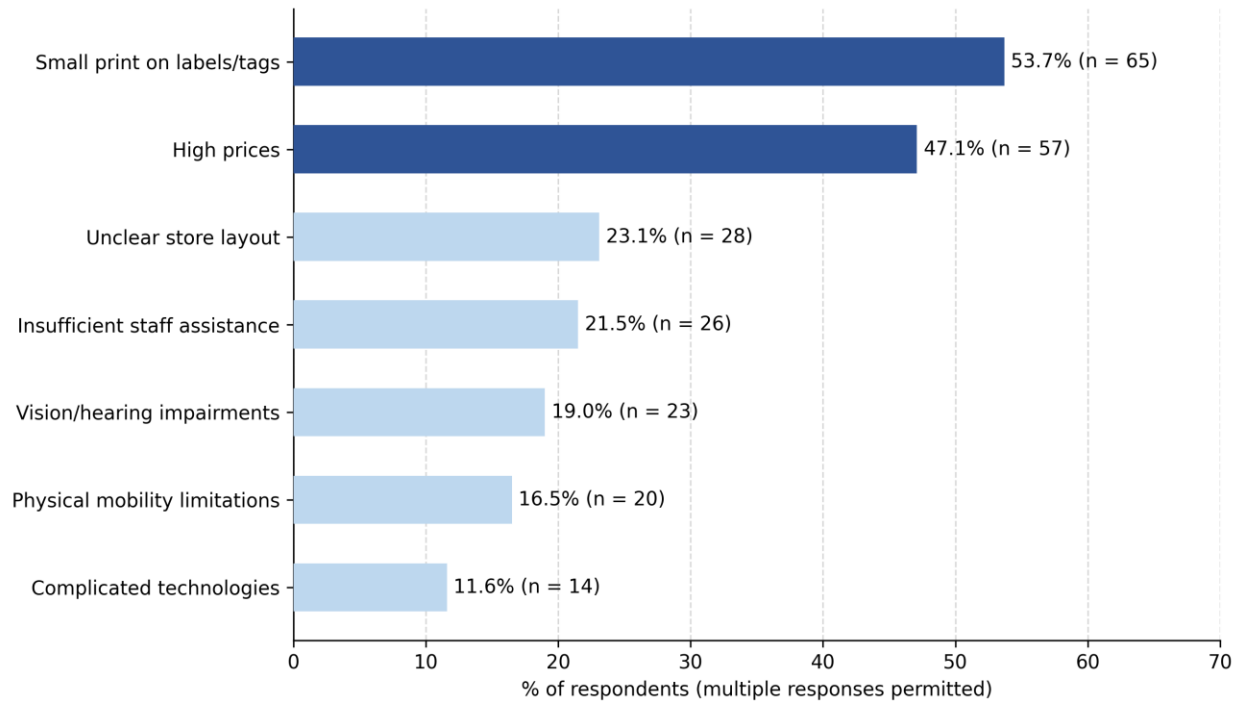
Table 6.5: Shopping Barriers Reported by Older Adults (multiple responses, n = 121)

Barrier	n	% of 121	Age-related trend (χ^2 test)
Small print on labels/price tags	65	53.7%	No significant age trend ($p = 0.414$) – universal barrier
High prices	57	47.1%	No significant age trend ($p = 0.443$) – universal barrier
Unclear store layout	28	23.1%	No significant age trend
Insufficient staff assistance	26	21.5%	No significant age trend
Vision or hearing impairments	23	19.0%	Significant age trend: 8.7% (60–65) → 45.5% (81+), $\chi^2(4) = 13.82$, $p = 0.008$, $V = 0.34$
Physical mobility limitations	20	16.5%	Progressive with age
Complicated technologies	14	11.6%	Notable in 71+ cohorts

Source: Own survey, 2025. The distinction between universal barriers (affecting all age cohorts equally) and age-progressive barriers (intensifying with advancing age) has important implications for policy targeting.

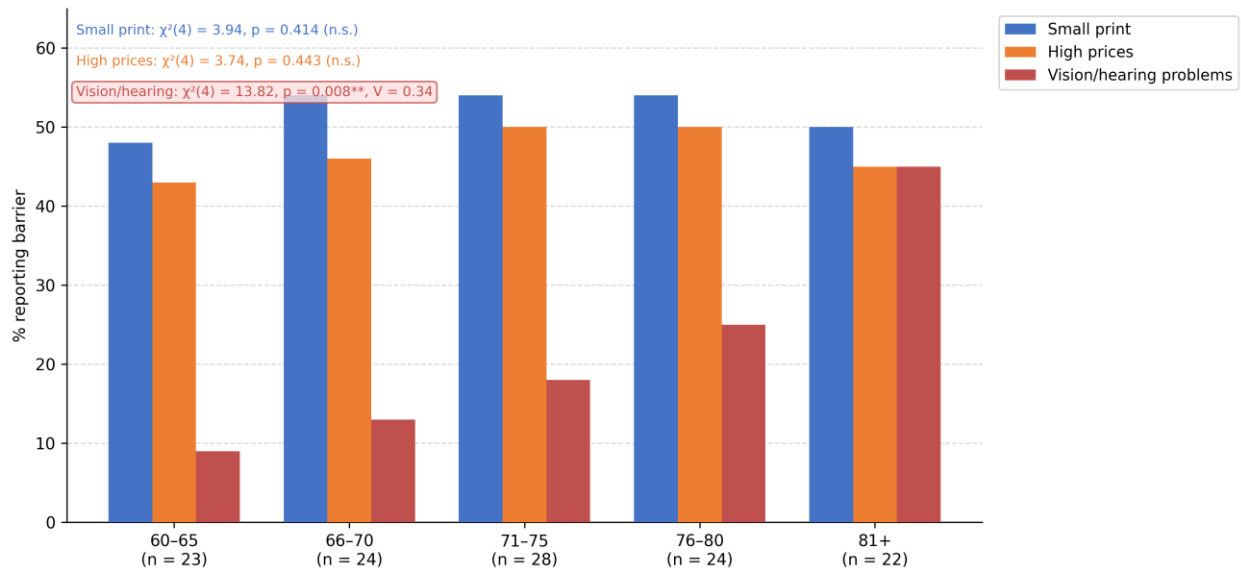
The barriers analysis reveals a dual exclusion mechanism: universal barriers (small print, high prices) affect older adults regardless of age, while progressive barriers (vision/hearing problems, $p = 0.90$, $p = 0.037$) intensify with advancing age. This distinction is critical for policy: while universal barriers require systemic environmental modifications (e.g. mandatory minimum font sizes on labels), progressive barriers demand personalised adaptive solutions.

Figure 6.7: Shopping Barriers Reported by Older Adults



Source: Own survey, 2025. Multiple responses permitted.

Figure 6.8: Key Shopping Barriers by Age Group with Chi Square Results



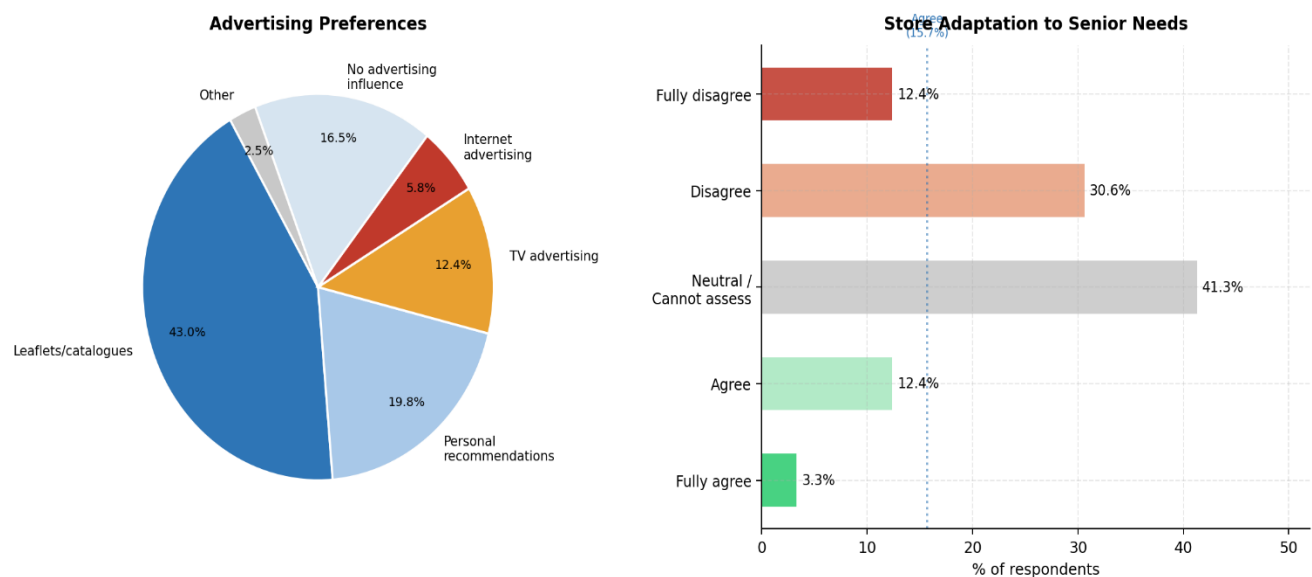
Source: Own survey, 2025. n = 121.

Source: Own survey, 2025. n = 121. $^{**}p < 0.01$.

Communication Preferences and Store Adaptation

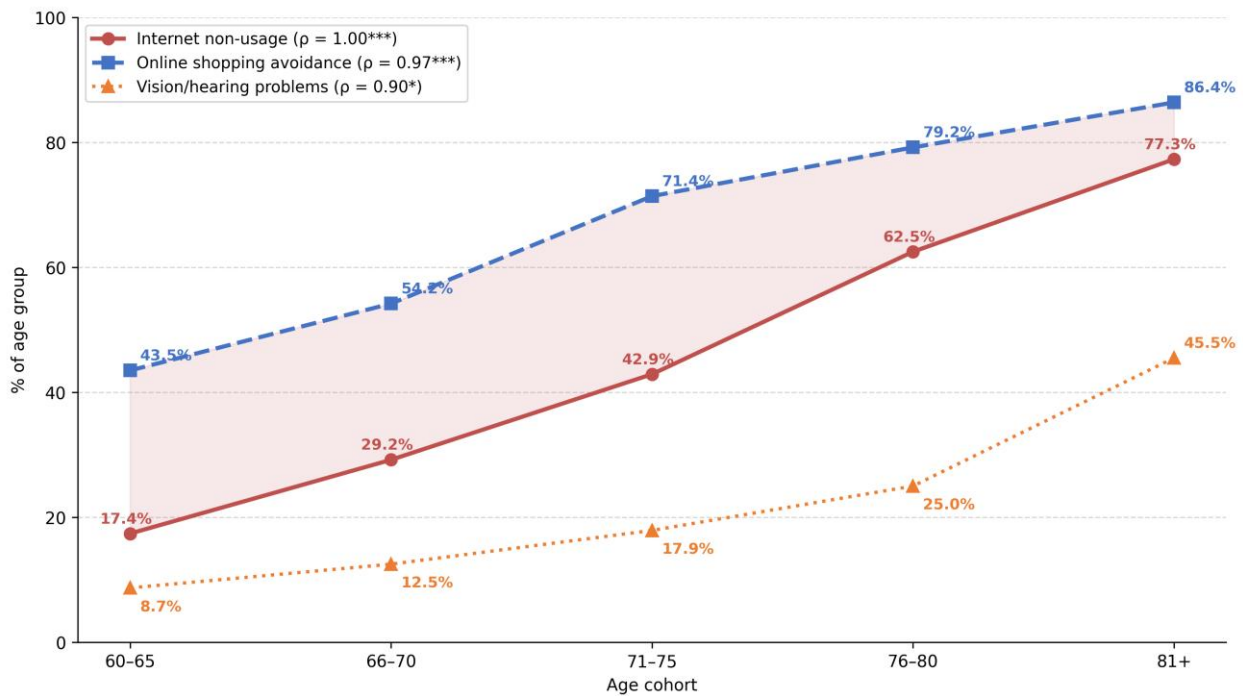
Older adults overwhelmingly preferred traditional communication channels: leaflets and catalogues (43.0%), followed by personal recommendations (19.8%). Internet advertising was preferred by merely 5.8%, exclusively among respondents under 70 years of age. Only 15.7% of respondents agreed or fully agreed that stores adequately consider older adults' needs, while 43.0% expressed disagreement. The most frequently mentioned improvement requests included price reductions and senior discount programmes, larger and higher-contrast print on labels, seating and rest areas within stores, stable product placement, more patient and knowledgeable staff, barrier-free access, and simplified alternatives to self-checkout technologies.

Figure 6.9: Key Shopping Barriers by Age Group with Chi Square Results



Source: Own survey, 2025.

Figure 6.10: Age-related Trends in Digital Exclusion and Sensory Barriers



Source: Own survey, 2025. $n = 121$.

Source: Own survey, 2025.

6.2.6 Integrating Quantitative and Qualitative Evidence: A Continuum of Digital Exclusion Across the Life Course

The three empirical investigations presented in this chapter, the technostress survey (Section 6.2.4), the consumer behaviour survey (Section 6.2.5), and the qualitative phenomenological study of self-efficacy (Chapter 4.3), collectively illuminate a single underlying process that operates across different life stages and institutional contexts. Considered together, they reveal a continuum of technology-related challenges that intensifies progressively across the life course and produces compounding disadvantage for ageing populations in an increasingly digitalised society.

Figure 6.11: Life Course Model of Digital Exclusion – A Continuum

Stage 1: Mid-Career Workplace	Stage 2: Approaching Retirement	Stage 3: Post-Retirement Life	Policy Entry Points
Technostress accumulation (pace overload, inadequate training, constant tech change)	Declining digital confidence; creeping technology avoidance	Consumer & public service digital exclusion; sensory barriers compound	Each stage requires targeted intervention
SK: 28.9% effective prevention PL: 30.8% effective prevention	Workers 45+ most vulnerable; retirement transition high risk	67.8% never shop online; 77.3% non-users aged 81+	Life course integrated approach essential
Evidence: Kaššayová (2025), Ch. 6.2.4	Evidence: Froidevaux et al. (2018), Psychosocial retirement transition	Evidence: Regional consumer survey, Ch. 6.2.5; Phenomenological study Ch. 4	Source: Authors' integrated analysis (Chs. 5–6)

Source: Authors' elaboration based on integrated analysis of technostress survey (Kaššayová, 2025), consumer survey (own, 2025), and phenomenological investigation (Chapter 4.3). Each stage requires distinct policy interventions; a life course approach addresses accumulation across all three stages.

The technostress data document the starting point of this continuum: among employees aged primarily 35–44 years, only approximately 29–31% of enterprises have effective prevention measures in place. The consumer behaviour data document the endpoint: internet non-usage increases monotonically from 17.4% in the youngest cohort to 77.3% among those aged 81 and above. The qualitative findings from Chapter 4 provide the interpretive bridge: participants did not describe their digital difficulties as sudden incapacities but as a progressive erosion of confidence and control. The participant who stated ‘the challenge is not change itself but being severed from it’ articulates precisely the experience that technostress research identifies at the

workplace level: not the inability to learn, but the absence of sufficient time, support, and recognition to do so.

Triangulating across these three datasets reveals three convergent findings. First, the origins of digital exclusion in later life are likely to be found in mid-career workplace experiences rather than in retirement itself, suggesting that interventions targeting older adults after they leave employment may be addressing consequences rather than causes. Second, the compounding nature of digital and sensory barriers creates a dual exclusion mechanism that cannot be resolved through single-domain interventions. Third, the subjective experience of digital exclusion is inseparable from broader questions of autonomy, dignity, and social participation.

6.3 Social Work Perspectives: Social Health Relationships

The intersection of social factors and health outcomes encompasses a critical domain for sustainable approaches to ageing. Social work perspectives offer unique insights into how relationships, community structures, and equity considerations shape the ageing experience across diverse populations.

This section examines three dimensions of the social health interface: social support networks and their health implications (6.3.1), community engagement as a mechanism of collective resilience (6.3.2), and equitable access to care as a social justice imperative (6.3.3). Together, these dimensions illustrate how the social work perspective enriches and complicates the economic analysis of Sections 6.1 and 6.2: health outcomes are not produced solely by healthcare services and economic conditions but by the quality of relationships, communities, and institutional environments within which older adults live. The evidence from the phenomenological investigation in Chapter 4 resonates throughout: the older adults who participated in that study were not describing abstract social determinants but their lived experience of how social connections, community belonging, and access to supportive services shape their daily sense of agency, dignity, and well-being.

Vaccination programmes represent one of the most well-evidenced and cost-effective public health interventions available to healthcare systems. Evidence consistently demonstrates that immunisation programmes generate strongly favourable

returns on investment through avoided treatment costs, reduced hospitalisation, and prevention of long-term disability (OECD/European Observatory on Health Systems and Policies, 2021). Slovakia has experienced a declining vaccination rate in selected childhood and adult programmes in recent years, falling behind other European countries in this domain and creating increased vulnerability to preventable infectious disease outbreaks among both children and older adults (IHME, 2016). Strengthening immunisation coverage therefore represents both a public health priority and a cost-effective strategy for reducing future social care and healthcare demand.

6.3.1 Social Support and Health Outcomes

Social support networks function as powerful determinants of health outcomes among ageing populations, with robust evidence demonstrating their protective effects against both physical and psychological morbidity. Research indicates that older adults with strong social connections experience lower rates of cardiovascular disease, cognitive decline, and all-cause mortality compared to those experiencing isolation (Holt-Lunstad, 2021). These relationships operate through multiple pathways, providing emotional sustenance, facilitating access to resources, and promoting health-protective behaviours. Sustainable ageing frameworks must recognise that social support structures vary significantly across cultural contexts; within collectivist societies, family-based caregiving networks often predominate, while more individualistic societies may rely on formal support services.

A large-scale meta-analysis analysed data from over three million individuals and found that adequate social connection was associated with a 45% reduction in all-cause mortality compared to social isolation, an effect size comparable to that of stopping smoking and substantially greater than the protective effects of exercise or weight management. This evidence repositions social isolation not as a personal misfortune but as a public health emergency of the first order, requiring population-level responses alongside individual support. For Slovakia, where 30.6% of surveyed older adults live alone (Section 6.2.5) and community service infrastructure is unevenly distributed, the health consequences of inadequate social support are both extensive and preventable.

Social support networks operate through multiple physiological and behavioural pathways. Emotionally supportive relationships buffer against the chronic stress response, reducing cortisol levels, modulating inflammatory markers, and supporting immune function, that underlies much age-related physical morbidity. Instrumental support enables older adults to manage health conditions, attend medical appointments, and maintain the daily activities that preserve functional independence. Informational support helps older adults navigate complex healthcare and bureaucratic systems, directly addressing the ‘institutional incompetence’ identified as a central driver of self-efficacy fragmentation in Theme 1 of Chapter 4. Professional social work with older adults has a critical role in identifying isolated individuals, facilitating connection to community resources, and providing the bridging function between personal networks and formal services.

The post-pandemic period presents both a challenge and an opportunity for social support in ageing populations. The COVID-19 pandemic imposed extended social isolation on older adults who were already at risk, with measurable consequences including increased rates of depression, accelerated cognitive decline, and deteriorating functional capacity in those who were confined to home with minimal social contact. Systematic outreach to identify and re-engage socially isolated older adults, through GP surgeries, social services, voluntary organisations, and community champions, is an urgent priority as communities complete their post-pandemic recovery. At the same time, the digital communication skills that many older adults developed during the pandemic, often with family support, create new opportunities for maintaining social connections across distance that can be built upon through structured digital literacy support.

6.3.2 Community Engagement and Collective Resilience

Community engagement serves as a cornerstone of sustainable ageing, with participatory approaches fostering collective resilience. According to WHO (2020), the concept of ‘ageing in community’ extends beyond traditional ageing in place models to emphasise older adults’ active participation in community development and decision-making processes.

Evidence from initiatives such as Manchester's internationally recognised Age-Friendly Strategy demonstrates how systematic community engagement contributes to improved physical health, enhanced psychological well-being, and strengthened community infrastructure (Buffel & Phillipson, 2018). Manchester's approach, which began with extensive participatory research across the city's diverse neighbourhoods and then used findings to drive investment priorities across housing, transport, public spaces, and social participation, illustrates how procedural justice (genuine participation in planning) produces both better-designed environments and stronger social cohesion. The programme's most important lesson may be that age-friendliness is not a specialised add-on to mainstream city development but a fundamental dimension of sustainable communities that benefits residents across the life course.

For Slovak municipalities, the WHO's Age-Friendly Cities and Communities programme offers a structured framework for community engagement that has been implemented across diverse European contexts. The programme is organised around eight domains, including outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information, as well as community support and health services. This framework provides a comprehensive audit and planning structure that directs attention to the full range of environmental and social conditions affecting older adults.

Several Slovak municipalities, including Bratislava, Prešov and Nitra, have begun engagement with the programme; scaling this participation to the regional and national level, with adequate technical support and exchange platforms, would create a Slovak Age-Friendly Cities network capable of accelerating the diffusion of successful practices.

Community engagement is also a mechanism for building collective resilience, the capacity of communities to absorb and recover from shocks. Communities with dense social networks, active civic participation, and effective collective decision-making are substantially better positioned to support vulnerable members during crises, whether pandemics, extreme weather events, or economic disruptions, than communities characterised by social fragmentation and weak civic infrastructure. Social work investment in community development therefore contributes not only to the immediate

well-being of current older adults but to the long-term adaptive capacity of communities navigating the prolonged and multi-dimensional transition of demographic ageing.

6.3.3 Access to Care and Social Equity

Access to care exemplifies a crucial field where social inequities translate into health disparities among ageing populations. Social work perspectives highlight how structural barriers, including geographic isolation, financial constraints, discrimination, and digital divides, create uneven access landscapes that disproportionately affect marginalised communities. Sustainable approaches to ageing must address these inequities through both targeted interventions and systemic reforms that recognise the intersectionality of age with other social identities, including gender, race, socio-economic status, and disability (Cole & Duncan, 2023). Digital navigation assistance programmes, where trained volunteers help older adults access online health resources, represent one innovation that addresses digital literacy barriers while building social connections (Jimenez et al., 2021).

The geographic dimension of care access deserves particular attention in the Slovak context, where significant disparities exist between urban centres and rural or peripheral communities. The concentration of specialist healthcare, social services, and digital infrastructure in regional capitals creates a structural disadvantage for older adults in smaller municipalities, where the simultaneous closure of local services, depopulation of younger age cohorts, and ageing of the remaining population compound to create acute vulnerability. An older person living in a village of five hundred inhabitants in eastern Slovakia, for example, faces categorically different access conditions than one living in a city such as Bratislava or Banská Bystrica, yet national policy frameworks frequently treat the older adult population as a homogeneous category for planning purposes. Age-sensitive territorial impact assessments, conducted before decisions to close healthcare facilities, bank branches, post offices, or public transport routes are finalised, would create a structured mechanism for identifying and mitigating the disproportionate impacts on older rural residents before they materialise as service crises.

The intersectional dimension of care access extends beyond geography to encompass the compounding disadvantages faced by older adults who belong to multiple marginalised groups simultaneously. Older Roma women in rural Slovakia, older adults with sensory or cognitive impairments who lack family support networks, and older migrants navigating care systems in a language that is not their first all face access barriers that standard service design does not address and standard data collection does not capture. The commitment of social work to social justice requires not only acknowledging these intersectional vulnerabilities in theory but also developing practice models, outreach strategies, and advocacy mechanisms that reach the most excluded members of ageing populations rather than those already connected to formal service systems.

The evidence assembled across the preceding chapters converges on a single imperative: sustainable ageing demands coordinated, evidence-based policy responses that simultaneously address the intersecting challenges of health, economics, social participation, technological transformation, and environmental sustainability. Chapter 7 translates these research findings into an integrated policy framework with concrete implementation strategies.

7 Policy Recommendations for Sustainable Ageing

The research presented throughout this monograph has identified critical challenges and opportunities for sustainable ageing across health, economic, social, and technological dimensions. Drawing upon the comparative demographic analysis of Slovakia and Norway (Chapter 5), the qualitative investigation of self-efficacy among Slovak older adults (Chapter 4), the technostress survey and consumer behaviour survey (Chapter 6), as well as the conceptual frameworks synthesised in Chapters 1–3, this chapter formulates an integrated policy framework with evidence-based implementation strategies, monitoring and evaluation approaches, and future research directions.

The recommendations are structured around four interconnected policy domains corresponding to the paradigmatic structure developed in Chapter 2 (Section 2.14): individual empowerment and health, economic sustainability and financial security, social inclusion and community development, and technological integration and digital equity.

7.1 Integrated Policy Framework

The fragmented nature of current ageing policy, with health, social services, housing, employment, and technology governed by separate ministries, budgets, and legislative frameworks, was identified across multiple chapters as a fundamental obstacle to sustainable ageing. Chapter 4 documented how the fragmentation of competencies in Slovakia's social services system creates dependency rather than empowerment, while Chapter 6 demonstrated that digital exclusion, financial insecurity, and health barriers compound across policy domains to create cumulative disadvantage. The OECD (2022) has similarly identified policy fragmentation as a key challenge for Slovakia's response to an ageing population.

The integrated policy framework proposed here rests on four pillars, each derived from the monograph's empirical evidence (see Figure 7.1).

Figure 7.1: Integrated Policy Framework – Four Pillars for Sustainable Ageing

Pillar I Individual Empowerment & Health	Pillar II Economic Sustainability & Financial Security	Pillar III Social Inclusion & Community Development	Pillar IV Technological Integration & Digital Equity
WHO ICOPE framework adoption	Flexible retirement (Norway 2011 model)	Age-friendly community action plans	‘No one left offline’ principle
Mental health integrated in primary care	Senior discount programmes	Community-based ageing in place	Cognitively aligned digital literacy
Empowerment model in social service legislation	Financial literacy for digital services	Intergenerational programmes	Mandatory accessible design for public services
Preventive home visits (Norway model)	Silver economy at community level	Retail accessibility standards	Age-differentiated workplace digital support

Source: Authors’ elaboration based on integrated empirical evidence (Chapters 4–6) and international frameworks (WHO, 2019, 2023; European Commission, 2021). Pillar colours correspond to the four paradigmatic domains of the Integrated Model of Ageing Paradigms (Chapter 2, Section 2.14).

7.1.1 Pillar I: Individual Empowerment and Health Promotion

The qualitative findings from Chapter 4 reveal that older adults in Slovakia maintain significant competence in familiar domains but experience acute disempowerment when confronting bureaucratic, technological, and institutional systems. The concept of ‘fragmented autonomy’ identified in this investigation represents a key target for policy intervention. Evidence-based recommendations include: (1) adoption of the WHO’s Integrated Care for Older People (ICOPE)

framework, emphasising person-centred assessment of intrinsic capacity; (2) integration of mental health and cognitive support into primary care rather than specialised services; and (3) operationalisation of the empowerment approach through legislation requiring that social services demonstrate measurable support for older adults' decision-making autonomy.

Preventive home visit programmes represent a particularly well-evidenced Pillar I intervention. Annual functional assessments conducted by trained social workers or community health workers for all adults aged 75 and above identify emerging health, social, and functional risks before they generate crisis-level need. Evidence from Nordic contexts, including Norway's systematic home-visit programme for 75-year-olds, demonstrates that these visits connect isolated individuals to community resources, identify medication risks, assess home safety, and provide a human contact point for older adults whose social networks have shrunk through bereavement and mobility limitation. Crucially, they operate in the home environment that the research in Chapter 4 identifies as the central space of autonomy and control, reducing the institutional barriers that formal service settings create.

The WHO's ICOPE framework provides a globally validated approach for implementing Pillar I at the primary care level (WHO, 2019). The ICOPE screening protocol assesses six domains of intrinsic capacity: cognitive, psychological, locomotor, vitality, sensory, and communication, enabling early identification of decline and personalised care planning before clinical thresholds requiring specialist intervention are reached. Slovakia's primary care infrastructure, while strained, provides the geographic distribution needed for ICOPE implementation; the primary constraint is training and time. Integrating ICOPE screening into standard GP consultations for patients aged 60 and above, supported by community care coordination, would create a systematic preventive pathway that the current healthcare system lacks.

Evidence-based targets for preventive care investment provide a concrete benchmark for policy reform. Research on OECD countries indicates that the optimal allocation to preventive care is approximately 1.175% of gross national product (Wang & Wang, 2021), while Slovakia currently allocates roughly 0.05% of GDP to this domain;

this stark disparity in preventive care investment represents one of the most significant structural deficiencies in the Slovak healthcare system (Eurostat, 2023). Closing even a portion of this gap through sustained reallocation of healthcare resources towards prevention would, based on available evidence, yield measurable improvements in population health outcomes, reductions in avoidable mortality, and long-term savings in curative care expenditure.

7.1.2 Pillar II: Economic Sustainability and Financial Security

Slovakia's old-age dependency ratio increased from 19.7 to 27.9 per 100 working-age persons between 2015 and 2024 (see Chapter 4), with Eurostat projections indicating that the share of the population aged 65+ will reach 31.3% by 2060. Micro-level evidence from the consumer behaviour survey presented in Chapter 6 highlights the economic pressures facing Slovak older adults: 79.3% depend solely on retirement pensions, and 47.1% identified high prices as a major shopping barrier. Policy recommendations include pension reform following the Norwegian flexible retirement model, targeted financial support mechanisms, and silver economy strategies recognising older adults' economic contributions through informal caregiving, volunteering, and knowledge transfer (Klimczuk, 2021).

Pension reform is both the most impactful and the most politically challenging Pillar II intervention. The Norwegian flexible retirement model's key innovation is the option to retire from age 62 with actuarial adjustments, without penalising continued employment. This enables workers to calibrate retirement timing to individual circumstances, including health status, occupational demands, financial situation, and personal preferences. This flexibility has universal benefits: employers can retain experienced workers beyond rigid retirement ages; workers can manage gradual rather than abrupt transitions; and the pension system generates longer average contribution periods. Implementation in Slovakia would require legislative reform of the Social Insurance Act, negotiation with employer and trade union stakeholders, and careful transition arrangements for workers already approaching the current retirement age.

The silver economy's potential to complement formal pension income and reduce financial precarity among older adults is significant but currently underdeveloped in

Slovakia. Local silver economy strategies, developed at the municipal level, identifying specific opportunities for older adults to contribute as producers, service providers, mentors, and community organisers, would create a structured framework for recognising and supporting these contributions. In communities facing simultaneous demographic ageing and economic decline, the silver economy can function as a revitalisation strategy, mobilising the knowledge, social capital, and time resources of older residents as assets for community development rather than treating them as demographic burdens to be managed.

7.1.3 Pillar III: Social Inclusion and Community Development

The convergence of evidence from the qualitative investigation in Chapter 4 and the consumer behaviour survey presented in Chapter 6 underscores the centrality of social inclusion to sustainable ageing. Chapter 4 identified that older adults' subjective sense of control is fundamentally tied to remaining in their home environment. The consumer behaviour data revealed that 44.6% of respondents are widowed and 30.6% live alone. Recommendations include expansion and proper resourcing of community-based ageing-in-place programmes; development of intergenerational programmes for social cohesion and knowledge transfer; and recognition that the commercial environment constitutes a site of social participation for older adults, necessitating retail accessibility standards and the preservation of physical retail spaces.

Evidence from the consumer behaviour survey in Chapter 6 shows that only 15.7% of respondents felt that stores adequately consider older adults' needs, while 43.0% actively disagreed. This indicates a significant failure of market responsiveness. Consumer behaviour research demonstrates that older adults are among the most loyal customers when their needs are met; the commercial sector's failure to design for older users is therefore not only a social equity issue but a business strategy failure with measurable economic consequences. Regulatory standards mandating minimum retail accessibility requirements, minimum font sizes on labels and signage, provision of seating and rest areas, stable product placement, and accessible payment systems, would correct a market failure while serving the broader social inclusion agenda.

The preservation of physical retail spaces and locally accessible services deserves explicit attention as a Pillar III policy concern. The closure of local shops, bank branches, post offices, and pharmacies in smaller communities disproportionately affects older residents who have the greatest difficulty travelling to more distant alternatives. Planning regulations that require impact assessments for retail closures in communities above certain age concentration thresholds, combined with support for community-owned shops and multi-service hubs that aggregate essential services in a single accessible location, would protect the commercial infrastructure on which older adults depend for both practical and social purposes.

7.1.4 Pillar IV: Technological Integration and Digital Equity

The most consistent finding across empirical investigations is the challenge posed by digital transformation for ageing populations. As shown in earlier chapters, participants described acute anxiety about technological systems mediating access to essential services, while survey evidence demonstrates that workplace digitalisation creates significant stress even among relatively young workers. Consumer behaviour data further quantify digital exclusion: 67.8% of older adults never shop online, and 52.1% never use the internet for product information. Policy recommendations include the ‘no one left offline’ principle (all public services must maintain accessible non-digital alternatives); digital literacy programmes designed according to evidence on cognitive functioning in later life; mandatory age-inclusive design standards for digital public services; and age-differentiated digital support programmes in organisations, with particular attention to workers aged 45+ approaching retirement.

The ‘no one left offline’ principle should be enshrined in legislation, not merely adopted as administrative guidance. All public services, healthcare appointment booking, prescription management, pension enquiries, tax filing, social benefit applications, and official communications, must maintain fully functional, dignified, and equally accessible non-digital alternatives. This is not a temporary accommodation for the current generation of older adults but a permanent commitment to service universality. Norway’s Public Administration Act provides a transferable model; Slovakia should establish equivalent legal protection as a matter of digital rights legislation.

Mandatory age-inclusive digital design standards address the problem upstream, before it requires compensatory intervention. Interface design choices that are taken for granted by younger designers, small fonts, low contrast, multi-step navigation, disappearing menus, complex password requirements, and time-limited session windows, create disproportionate barriers for older users with reduced visual acuity, slower processing speed, and less prior experience with digital conventions. Universal design principles, mandated for all public sector digital services and incentivised for private sector platforms serving essential services, would reduce exclusion at scale without requiring older adults to develop advanced digital literacy as a prerequisite for civic participation.

7.2 Implementation Strategies

Translating the four-pillar policy framework into concrete institutional change requires implementation strategies that address the distinctive constraints of the Slovakia context: a history of fragmented inter-ministerial coordination, significant capacity gaps at the municipal and regional level, limited long-term care financing, and a civil society sector that is innovative but chronically under-resourced. In response to these constraints, three strategic dimensions are examined in this section: multi-level governance and cross-sectoral coordination (7.2.1), participatory design and co-production (7.2.2), and phased implementation with realistic priority sequencing (7.2.3). These strategies are not sequential but interdependent: governance structures shape the conditions for participation, while phased implementation must be embedded in governance architecture from the outset to be credible.

The experience of comparable Central European countries offers instructive lessons for implementation. Within the Visegrád Four, Poland and the Czech Republic have demonstrated that higher preventive care investment is associated with better preventable mortality outcomes, even without higher overall healthcare expenditure as a share of GDP (OECD/European Observatory on Health Systems and Policies, 2021). This suggests that reallocation within existing healthcare budgets, rather than requiring additional fiscal resources, may be sufficient to achieve meaningful improvements in prevention investment levels. Phased implementation beginning with the highest-return

interventions, tobacco control, cardiovascular risk reduction, immunisation programme strengthening, and early cancer detection, would enable measurable progress within the medium-term policy horizon.

7.2.1 Multi-Level Governance and Cross-Sectoral Coordination

The OECD (2022) has identified the lack of cross-sectoral coordination as a primary weakness of Slovakia's ageing policy landscape. A cross-ministerial task force on sustainable ageing should be established at the national level, with representation from health, labour, social affairs, education, environment, and digital transformation ministries. At the regional level, existing self-governing regions should be mandated to develop integrated ageing strategies. At the municipal level, age-friendly community action plans should be developed through participatory processes that include older adults as co-designers, consistent with the WHO's age-friendly cities framework (WHO, 2023).

A cross-ministerial task force on sustainable ageing should be established by government decision at the national level, with a permanent secretariat housed in the Deputy Prime Minister's Office for Digitalisation to ensure cross-ministerial authority. The task force should include representation from the Ministries of Labour, Health, Finance, Education, Environment, and Investments and Digitalisation, alongside the Association of Slovak Towns and Municipalities, the Union of Self-Governing Regions, major civil society organisations, and a Senior Citizens' Advisory Panel whose members are selected to represent diversity across age cohorts, gender, geography, and socioeconomic background. This structure directly addresses the coordination deficit identified by the OECD while creating an institutional home for the integrated policy framework.

Accountability mechanisms are essential for converting coordination structures from paper commitments to real behavioural change. The task force should be required to produce annual cross-sectoral sustainable ageing reports, publicly tracking progress against defined indicators (linked to the monitoring framework in Section 7.3), identifying coordination failures and gaps, and making binding recommendations to individual ministries with timelines for response. Parliamentary oversight through a dedicated

subcommittee on ageing would provide political accountability and ensure that the task force retains sufficient political salience to drive action across ministries with competing priorities.

7.2.2 Participatory Design and Co-Production

A consistent finding across the monograph is that sustainable ageing policies fail when designed for, rather than with, older adults. Implementation should institutionalise participatory mechanisms at every level: national policy consultations, including dedicated senior advisory panels with representation across age cohorts (60–70, 70–80, 80+), gender, socioeconomic status, and urban–rural location. At the municipal level, age-friendly initiatives should employ older adult co-researchers in needs assessments and service evaluations.

Participatory design requires genuine power sharing, not cosmetic consultation. The distinction between authentic co-production, where older adults shape decisions from problem definition through design and evaluation, and tokenistic participation, where professionals make decisions and older adults are invited to validate them post hoc, is central to achieving the empowerment outcomes that Chapter 4 identifies as essential for sustainable ageing. Institutional mechanisms that ensure authentic participation include the following: veto rights for senior advisory panels on specific categories of decisions directly affecting older adults; co-researcher roles with paid employment contracts rather than volunteer or expense reimbursement status; and evaluation criteria for publicly funded programmes that explicitly assess the depth and authenticity of older adult participation.

Digital co-design deserves specific attention given the centrality of digital inclusion to the monograph's findings. Older adults' meaningful participation in the design of digital public services, not as final user testers but as co-designers from the earliest conceptual stages, is the most effective mechanism for producing genuinely accessible interfaces. When older adults with limited prior digital experience participate in early-stage design workshops, they reveal usability barriers that younger designers systematically overlook: font contrast, navigation logic, error recovery, session time limits, and the emotional experience of confusion and failure that poorly designed

interfaces inflict. The Deputy Prime Minister's Office for Digitalisation should mandate participatory design processes with older adult representatives as a condition of public sector digital service procurement.

7.2.3 Phased Implementation and Priority Sequencing

Given resource constraints, implementation should follow a phased approach. Table 7.1 summarises priorities by timeframe, lead actors, and the specific monograph evidence underlying each priority.

Table 7.1: Phased Implementation Roadmap for Sustainable Ageing Policy :

Timeframe	Priority Actions	Lead Actors	Monograph Evidence Base
Short term (1–2 years)	Mandatory non-digital service alternatives for all public services; accessibility audits of retail environments; expansion of senior day centres as digital literacy hubs	Ministries of Labour, Digital Transformation; Municipalities	Ch. 5: Digital exclusion as structural barrier; Ch. 6: Consumer survey: barriers identified
Medium term (3–5 years)	Cross-ministerial coordination body; pension system flexibility (Norwegian model); integrated health and social care assessment (Act 376/2024 implementation); age-inclusive digital design standards	Government Office; Ministry of Health; Ministry of Labour; Regulatory bodies	Ch. 4: Dependency ratio projections; Ch. 6.2.4: Technostress prevention gap (only 29–31% effective measures)
Long-term (5–10 years)	Full deinstitutionalisation of social care; comprehensive	Regional Self Governments; Municipalities; Civil	Ch. 5: Community dimension of sustainable

	community-based care infrastructure; integration of ageing into environmental and urban planning; national digital equity strategy	Society; Research institutions	ageing; Ecosocial approach (5.2.1); Ch. 2: Systems Integration Paradigm
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Source: Authors' elaboration based on monograph findings and international policy frameworks.

Reform priorities are sequenced by feasibility, urgency, and systemic impact.

7.3 Monitoring and Evaluation Approaches

Effective monitoring of sustainable ageing policies requires indicators that capture not only objective outcomes but also subjective dimensions of well-being, autonomy, and social participation. The following multi-level monitoring framework is proposed (Table 7.2):

Table 7.2: Proposed Monitoring Indicators for Sustainable Ageing Policy

Policy Domain	Indicator	Data Source	Monograph Evidence Base
Health and Empowerment	% of seniors reporting self-efficacy in health management	Longitudinal survey (SHARE database)	Ch. 4: Fragmented autonomy theme; phenomenological investigation
Economic Security	At risk of poverty rate among 65+ population	EU SILC / Eurostat	Ch. 5: Dependency ratios; Ch. 6: Consumer survey: 79.3% pension dependent
Digital Inclusion	Internet usage rate among 65+ by activity type	Eurostat Digital Economy survey	Ch. 6: 67.8% never shop online; $\chi^2 = 27.43$ age–internet link; $p = 1.00$ cohort trend
Social Participation	% of seniors participating in community activities	WHO Age-Friendly City audit; municipal data	Ch. 4: Home as space of control; Ch. 6: Shopping as social activity
Consumer Accessibility	% of retail outlets meeting age-friendly standards	Municipal accessibility audit	Ch. 6: 53.7% small print barrier; 43%

			perceive stores as not adapted
Workplace Adaptation	Technostress levels among 45+ workers	Employer surveys; occupational health data	Ch. 6: Technostress SK vs PL; work pace overload dominant stressor
Service Integration	Ratio of community-based to residential care recipients	Ministry of Labour statistics	Ch. 4: Deinstitutionalisation imperative; preference for home environment

Source: Authors' elaboration based on monograph findings and international frameworks (WHO, 2019, 2023; Eurostat, 2020). Monitoring should combine Eurostat quantitative data with SHARE longitudinal surveys and periodic qualitative evaluation using phenomenological approaches such as those described in Chapter 4.

The monitoring framework should be operationalised through several mechanisms: the WHO's Age-Friendly Cities and Communities evaluation framework (WHO, 2023); the Survey of Health, Ageing and Retirement in Europe (SHARE) for longitudinal cross-national comparison; and the Active Ageing Index (AAI), developed jointly by the European Commission and UNECE (Foster & Walker, 2021). Qualitative evaluation should complement quantitative indicators, using approaches such as the phenomenological methodology employed in Chapter 4.

Preventable mortality rates provide a particularly sensitive and internationally comparable indicator for monitoring the effectiveness of prevention investment. Slovakia's rate of 189 preventable deaths per 100,000 inhabitants in 2019, among the highest in the European Union, establishes a clear baseline against which policy progress can be measured (Ministry of Finance of the Slovak Republic & Ministry of Health of the Slovak Republic, 2019). Regular reporting against this indicator, disaggregated by cause of death, age group, and region, would enable systematic tracking of progress towards prevention investment targets and provide early warning of emerging population health challenges requiring policy response.

7.4 Future Research Directions

The empirical investigations in this monograph, the demographic analysis of Chapter 5, the phenomenological study of Chapter 4, and the two quantitative surveys of Chapter 6, each make original contributions while simultaneously revealing the boundaries of current knowledge and the research questions that their findings generate. This section identifies six priority directions for advancing the empirical foundation of sustainable ageing policy in Slovakia and comparable Central European contexts. The research agenda reflects both the specific gaps in the current evidence base and the broader theoretical questions about the relationship between welfare state design, individual agency, and the lived experience of ageing that this monograph has raised but cannot fully resolve.

7.4.1 Longitudinal Research on Digital Exclusion Trajectories

The consumer behaviour survey established a cross-sectional association between age and digital exclusion ($\chi^2 = 27.43$, $p < 0.001$), but the cross-sectional design cannot distinguish between cohort effects and ageing effects. Longitudinal research is needed to determine whether current cohorts of digitally literate adults will maintain digital engagement as they age, or whether age-related cognitive and sensory changes will produce progressive disengagement regardless of prior experience. The regional scope (Banská Bystrica, $n = 121$) should be extended through a nationally representative Slovak survey, enabling urban–rural comparison.

Methodologically, such a longitudinal study would require careful attention to attrition. Older adults who experience health decline or cognitive deterioration during the follow-up period may disengage from digital activities precisely because of those changes, creating selection bias in the surviving sample. Analytical strategies, including inverse probability weighting and joint models for longitudinal outcomes and dropout, would be needed to address this bias. Qualitative components embedded within the longitudinal design, such as narrative interviews at each wave exploring participants' changing relationship with digital technology, would provide the interpretive depth needed to understand the mechanisms driving quantitative trends.

7.4.2 Cross-National Comparative Research: Slovakia and Norway

Slovakia and Norway, despite similar ageing index levels (both crossing 100 around 2019–2020), exhibit fundamentally different demographic trajectories, welfare state models, and policy frameworks, as shown in Chapter 5. Comparative empirical research should examine how these structural differences translate into divergent lived experiences of ageing. Specifically, replicating the qualitative study among Norwegian older adults would enable systematic comparison of self-efficacy perceptions across welfare state contexts.

A comparative study would also enable examination of whether the ‘fragmented autonomy’ pattern identified in earlier findings is a specifically Slovak phenomenon reflecting particular institutional configurations, fragmented social services, complex bureaucratic systems, and limited digital accessibility infrastructure, or a more general feature of late-life self-efficacy in ageing societies, regardless of welfare state model. If the same fragmentation pattern is observed in Norway despite its more comprehensive welfare state, this would suggest that the sources of fragmented autonomy lie in universal features of ageing and institutional design rather than in policy-reversible conditions. If Norwegian participants show substantially different patterns, more integrated self-efficacy, less institutional incompetence, stronger sense of control across domains, this will provide powerful evidence for the policy thesis that welfare state design matters for subjective ageing experience.

7.4.3 Technostress Across the Life Course

The technostress survey was conducted among employed workers with a modal age of 35–44 years. Future research should extend this investigation to workers approaching retirement (55–65) and to retired populations navigating digital consumer and public service environments, testing the hypothesis of a ‘digital stress continuum’ that bridges workplace technostress and consumer digital exclusion.

A methodological priority for this research stream is the development of instruments that can validly and reliably measure technostress and digital self-efficacy across the full age range from 45 to 85+, spanning both employed and retired populations. Current technostress measurement scales were developed and validated

primarily with younger working populations; their validity for older adults, who have different work contexts, different technology repertoires, and different conceptual frameworks for understanding technology-related stress, cannot be assumed. Qualitative cognitive interviewing studies with older adults would be needed to adapt existing scales or develop new instruments appropriate for the full range of the life course.

7.4.4 Intervention Research on Empowerment Models

The transformation from ‘assistance models’ to ‘transformational models’ has been identified as an urgent imperative in earlier analysis. Intervention research should evaluate the impact of structured empowerment programmes, including co-designed digital literacy training, participatory community planning, and supported decision-making in healthcare, on measurable outcomes such as self-efficacy, social participation, and life satisfaction. Randomised controlled trials and quasi-experimental designs with matched control communities would provide the causal evidence needed to justify scaling successful interventions.

Process evaluation embedded within intervention trials would be equally important. Understanding not only whether empowerment programmes work but how they work, what mechanisms produce change, which participant characteristics moderate effectiveness, and what implementation conditions are necessary for fidelity, would enable much more targeted and efficient scaling than outcome-only evaluations provide. In the Slovak context, where resources for large-scale implementation are constrained, evidence about the conditions under which interventions succeed or fail is as valuable as evidence of average treatment effects under ideal conditions.

The experience of comparable Central European countries in implementing ageing policy reform offers both encouragement and caution for Slovakia’s phased approach. The Czech Republic’s gradual deinstitutionalisation of social care, accelerated through EU structural fund investment from 2014 onwards, demonstrates that transformation of deeply embedded residential care preferences is achievable within a single decade when financial incentives, legislative mandates, and professional training are aligned simultaneously rather than sequentially. However, the Czech

experience also illustrates the risk of implementation gaps: community-based alternatives that were planned to replace residential capacity were frequently underdeveloped at the point when residential places were reduced, creating transitional periods of service insufficiency that disproportionately affected the most dependent older adults. Poland's experience with pension system flexibility reform similarly shows that legislative changes to retirement age and contribution rules, without complementary investment in age-friendly workplace adaptation and phased retirement counselling, produce lower uptake than projected among precisely the worker groups the reform intended to benefit. These implementation lessons from neighbouring countries reinforce the monograph's consistent finding that sustainable ageing policy cannot be pursued domain by domain. The sequencing of reforms must be coordinated across pillars, with community care infrastructure, digital inclusion support, and workplace adaptation investment timed to precede rather than follow the structural changes that create demand for them.

7.4.5 Environmental Sustainability and Ageing

The ecosocial approach and the climate resilience literature discussed in earlier chapters point to an emerging research frontier. Future research should investigate how age-friendly environmental design intersects with climate adaptation in Central European contexts, particularly in Slovak communities where industrial legacy, urban morphology, and green space access create distinctive challenges for older populations.

The intersection of climate adaptation and ageing in Slovak cities presents research opportunities given the diversity of urban forms, industrial legacies, and green infrastructure endowments across the country. Košice, Banská Bystrica, Žilina, and Bratislava each present distinct configurations of urban morphology, heat island dynamics, green space accessibility, and older adult residential concentration that create natural comparative cases. Research mapping the spatial correlation between heat vulnerability, green space access, and older adult residential patterns in these cities would provide the evidence base for targeted green infrastructure investment that simultaneously advances climate adaptation and ageing-in-place policy.

7.4.6 Intersectionality in Ageing Research

Both the demographic data in Chapter 5 and the consumer behaviour survey in Chapter 6 highlight gender as a significant dimension of ageing inequality. Future research should adopt intersectional approaches (Cole & Duncan, 2023), examining how age intersects with gender, socioeconomic status, ethnicity, rurality, and disability to produce diverse experiences of ageing, including LGBTQ+ older adults in rural communities (McKay et al., 2024).

Intersectional research requires methodological innovation as well as substantive commitment. Standard survey instruments and sampling frames often fail to capture marginalised populations, Roma older adults are underrepresented in register-based samples, LGBTQ+ older adults are rarely identifiable in administrative data, and older adults with severe cognitive or communication impairments are excluded from most interview-based research. Reaching and authentically representing these populations requires community-based participatory research approaches, partnerships with trusted community organisations, adapted data collection methods, and interpretive frameworks that centre the perspectives of research participants rather than imposing external analytical categories. The investment required to conduct genuine intersectional research is substantial, but the cost of producing ageing policy based on evidence that systematically excludes the most marginalised older adults is greater.

7.5 Concluding Synthesis

The policy recommendations presented in this chapter represent an attempt to translate the multidisciplinary evidence assembled throughout this monograph into actionable guidance. The four-pillar integrated policy framework, encompassing individual empowerment and health, economic sustainability, social inclusion, and digital equity, reflects the multidimensional nature of ageing established in Chapters 1 and 2 and evidenced empirically in Chapters 4–6.

The key insight emerging from this synthesis is that sustainable ageing is not achievable through any single policy domain. The fragmented autonomy documented in Chapter 4 cannot be addressed by social services reform alone if the economic pressures documented in Chapter 5 continue to erode pension adequacy. Digital

exclusion cannot be resolved through technology training alone if the commercial and public service environments documented in Chapter 6 continue to design out non-digital alternatives. Social isolation cannot be combated through community programmes alone if institutional preferences in the care system continue to displace older adults from the familiar environments where they feel most autonomous.

What is required is the kind of integrated, paradigm-spanning approach that the conceptual model developed in Chapter 2 (Section 2.14) envisions, one that simultaneously addresses individual adaptation (Individual-Centred Paradigm), social participation (Society-Centred Paradigm), values and meaning (Cultural-Spiritual Paradigm), and systemic innovation (Systems Integration Paradigm). Sustainable ageing is not merely a demographic challenge to be managed but an opportunity to build societies that are more just, inclusive, and resilient across the entire life course. The pathway towards this goal is neither simple nor linear, but the evidence assembled here demonstrates that it is both necessary and achievable. Having established what needs to be done and how, Chapter 8 steps back to examine the deeper interdisciplinary mechanisms that explain why integrated approaches are not merely preferable but structurally necessary.

8 Interdisciplinary Synthesis and Implications for Practice

The preceding seven chapters have approached sustainable ageing from distinct but interconnected perspectives: conceptual frameworks and paradigmatic models, public health systems, demographic and economic analysis, social work practice, and integrated systems thinking. Chapter 8 serves a distinct purpose. Rather than introducing new empirical material, it draws these analytical threads together into an interdisciplinary synthesis, identifying the mechanisms through which biological, psychological, social, economic, and technological dimensions of ageing interact to produce outcomes that no single discipline can adequately explain or address. It then translates this synthesis into concrete implications for practitioners, researchers, and educators across the disciplines engaged in this monograph.

8.1 Interdisciplinary Synthesis: Convergent Mechanisms Across Disciplines

A central contribution of this monograph lies in demonstrating that the principal challenges of sustainable ageing are not discipline-specific problems with discipline-specific solutions, but rather emergent properties of interconnected systems whose dynamics only become visible when multiple analytical lenses are applied simultaneously. Three convergent mechanisms stand out as particularly significant across the empirical and theoretical evidence assembled here.

8.1.1 The Compounding Logic of Exclusion

Across every chapter, the evidence points to a single underlying dynamic: disadvantage in one domain amplifies disadvantage in others, creating compounding cycles that become progressively harder to interrupt as they accumulate over the life course. The demographic analysis in Chapter 5 establishes that Slovakia's rapid ageing trajectory creates structural fiscal pressure; but it is Chapters 4 and 6 that reveal how this pressure is experienced at the individual level as simultaneous exclusion from digital systems, institutional processes, consumer environments, and supportive social relationships. The participant in Chapter 4 who described being 'severed from' the changes around her was not articulating a psychological reaction to technology; she was describing the cumulative endpoint of a process that began in the workplace, as the

technostress data in Chapter 6 suggests, and intensified through each transition thereafter.

This compounding logic has a direct methodological implication: single domain interventions consistently fail to interrupt these cycles because they address consequences rather than the underlying accumulation process. A digital literacy programme that does not address the psychological legacy of workplace technostress will have limited uptake. A pension reform that raises retirement ages without addressing digital workplace adaptation will accelerate premature exits rather than preventing them. A community care programme that does not account for the retail and public service inaccessibility documented in Chapter 6 leaves the daily autonomy of older adults fundamentally unaddressed. Effective intervention requires mapping the full compounding chain and entering it at multiple points simultaneously, a conclusion that validates the integrated, four-pillar policy frameworks proposed in Chapter 7 and demands their implementation as a genuinely coordinated whole rather than a collection of parallel single-domain initiatives.

8.1.2 The Structural Production of Dependency

A second convergent finding, most powerfully articulated in the qualitative investigation in Chapter 4 but substantiated across the quantitative evidence of Chapters 5 and 6, is that dependency in later life is not primarily a product of biological decline but of structural design. Older adults in this study consistently demonstrated significant competence in familiar domains; the fragmentation of their autonomy arose not from age-related incapacity but from systems, bureaucratic, digital, and institutional, that were designed around assumptions of technological fluency and cognitive speed that do not reflect the heterogeneous capabilities of an ageing population. Van Dijk's (2012) sequential barrier model, introduced in Chapter 5, describes this process in the digital domain; but the phenomenological evidence of Chapter 4 demonstrates that identical dynamics operate across healthcare access, administrative systems, and formal service structures.

This finding carries profound implications for how the disciplines represented in this monograph understand their own contribution to the problem they seek to address.

Public health systems that digitise appointment booking without maintaining accessible alternatives do not neutrally adapt to modernity; they actively produce the dependency and health access barriers they are nominally designed to reduce. Social service systems that develop residential care capacity faster than community alternatives do not merely reflect demographic demand; they create the institutionalisation trajectories that the participants in Chapter 5 feared most acutely. Economic systems that reward efficiency over accessibility in retail and financial services do not simply respond to market signals; they construct the consumer exclusion that Chapter 6 quantified. Recognising the structural production of dependency requires each discipline to engage in critical self-examination of how its own practices and designs may inadvertently perpetuate the outcomes it seeks to prevent.

8.1.3 The Bidirectionality of Ageing and Society

A third synthesis finding concerns the relationship between ageing populations and the societies in which they are embedded. Throughout this monograph, this relationship has been shown to be fundamentally bidirectional: population ageing shapes economic structures, social services, healthcare systems, and technological development, while simultaneously those structures shape the experience, trajectory, and outcomes of ageing for individuals and communities. The ‘demographic scissors effect’ described in Chapter 5 is not simply a fiscal arithmetic problem; it is the product of decades of policy choices about fertility support, labour market regulation, healthcare investment, and pension design, and its consequences will in turn shape the policy choices available to the next generation.

This bidirectionality is most clearly visible in the comparison between Slovakia and Norway that runs through the monograph. Both countries arrived at a similar ageing index around 2019–2020, as Chapter 5’s long-run analysis demonstrated; yet the experience of ageing is profoundly different in the two contexts, reflecting not biological difference but decades of divergent institutional choices about universal health coverage, flexible retirement, community care infrastructure, and digital inclusion investment. This comparison is not an argument for Norwegian exceptionalism but rather an empirical demonstration that sustainable ageing is achievable through

deliberate institutional design, and that the window for such design, in Slovakia's case, is narrowing as the demographic transition accelerates.

8.2 Implications for Research and Practice

The interdisciplinary synthesis above points towards a set of implications for how researchers, practitioners, educators, and organisations across multiple fields should approach the challenge of sustainable ageing. These implications are organised by disciplinary domain but share a common orientation: the recognition that effective responses to ageing require crossing disciplinary boundaries, challenging existing institutional designs, and positioning older adults as active participants in defining and implementing solutions.

8.2.1 Implications for Social Work Practice

The qualitative investigation of Chapter 4 provides the most direct evidence base for social work practice. The three core experiential themes, fragmented autonomy, proactive identity, and home as space of control, carry immediate consequences for assessment, intervention design, and advocacy. Most fundamentally, they call for a decisive shift from deficit-based to strengths-based practice frameworks. Participants demonstrated substantial competence, resilience, and deliberate agency; yet surrounding systems consistently positioned them as passive recipients of care rather than active subjects with decisional authority. Social workers must therefore reorient their practice around identifying and sustaining the domains in which competence already exists, rather than cataloguing incapacities.

At the micro level, this means incorporating structured self-efficacy assessments that map competence across multiple life domains rather than focusing exclusively on functional deficits. Care planning must reflect the older adult's own hierarchy of valued activities and environments, with ageing in place treated not merely as a preference but as a psychological necessity. At the mezzo level, social workers must assume advocacy roles within the institutional systems that participants identified as primary sources of disempowerment, advocating for accessible digital service design, challenging bureaucratic complexity, and collaborating with healthcare administrators and policy teams to embed accessible design from the outset. The concept of the social worker as

an agent of transformative change is not rhetorical in this context; it reflects a genuine structural need that the empirical evidence substantiates. Community development competencies, asset mapping, participatory planning, intergenerational programming, and ecosocial practice, must be integrated into social work training as core rather than elective skills.

8.2.2 Implications for Public Health and Healthcare Systems

The public health implications operate across two temporal scales. Immediately, health systems must adapt to populations whose needs are shaped not only by biological ageing but by the social, digital, and economic exclusions documented throughout this monograph. In the longer term, life-course thinking must be embedded into health promotion, prevention resource allocation, and system design from the earliest stages. The most pressing immediate implication is the need for genuine integration of physical, mental, and social health services: the review in Chapter 1 demonstrates that cognitive, emotional, and social factors are constitutive of health, not secondary to it, and interventions that treat chronic disease without addressing loneliness, digital exclusion, or loss of purpose will consistently underperform.

The impact of the COVID-19 pandemic on Slovak male life expectancy, declining from 74.3 years in 2019 to 71.2 years in 2021, is a public health warning that cannot be treated as a statistical anomaly. It exposes the vulnerability of populations where socioeconomic disadvantage, lifestyle risk factors, and limited primary care access compound to produce acute mortality sensitivity. Norway's relative resilience during the same period reflects decades of investment in universal primary care and community health capacity. Digital inclusion must be treated as a health equity imperative: the finding that internet non-usage reaches 77.3% in the oldest consumer cohort means that health systems increasingly reliant on digital access channels are systematically excluding the population most dependent on their services. Mandatory parallel non-digital pathways for all health services are therefore not optional accommodations but structural prerequisites for equitable care.

8.2.3 Implications for Economic Policy and Labour Market Practice

The economic implications extend from macroeconomic pension reform to the microeconomic realities of individual older adults navigating consumer markets on fixed incomes. For labour market policy, the technostress evidence of Section 6.2.4 carries direct implications for employers: only 29–31% of surveyed enterprises have effective technostress prevention measures despite its documented productivity costs, representing an organisational governance failure with compounding consequences as workforces age. Age-inclusive digital training, designed around the cognitive learning patterns of older workers rather than the speed assumptions of younger colleagues, is a prerequisite for retaining experienced workers through the demographic transition. The Norwegian model of flexible retirement with actuarial adjustment, enabling gradual transitions that preserve both economic contribution and identity continuity, provides a viable framework for pension reform that current Slovak policy has not yet implemented. The consumer behaviour findings further imply mandatory accessibility standards for retail, financial, and public service environments, given that the population aged 65+ will constitute 31.3% of Slovakia's total population by 2060.

8.2.4 Implications for Interdisciplinary Research and Education

Perhaps the most far-reaching implication concerns how the field of ageing studies should be conceptualised, taught, and institutionally organised. The integrated model of Chapter 2 demonstrates that no single disciplinary framework is sufficient to capture the multidimensional reality of ageing as lived and experienced. Medical and nursing curricula should incorporate social determinants frameworks and community development principles. Social work programmes should include health economics, digital literacy education, and environmental sustainability. Public health training should integrate qualitative research methodologies that access the subjective dimensions of ageing that surveys cannot reach. Economics programmes addressing demographic change should engage seriously with the psychological and social literature on retirement, identity, and well-being.

Research institutions should invest in genuinely interdisciplinary ageing centres that bring together scholars around shared empirical questions rather than disciplinary

silos. The Slovak–Norwegian collaboration underpinning this monograph illustrates the analytical insights that emerge when demographic, social, and economic perspectives are systematically integrated. Expanding such cross-national partnerships, particularly between Central European post-transition economies and Nordic welfare states, would generate comparative evidence directly relevant to the ageing policy challenges both regions face. Finally, older adults themselves must be positioned as research participants, co-investigators, and knowledge producers rather than merely as subjects of inquiry: the phenomenological methodology of Chapter 4 demonstrates that they possess sophisticated capacity to articulate structural dynamics that institutional data sources cannot reveal. Embedding participatory research methodologies across the ageing studies field would both strengthen the scientific validity of findings and ensure that sustainable ageing is pursued not merely for older adults, but genuinely with them.

The translation of interdisciplinary insights into educational curricula represents a practical frontier that remains largely unaddressed in Central European academic institutions. Social work, nursing, medicine, and public health programmes in Slovakia continue to be structured around disciplinary silos that mirror the fragmented institutional landscape this monograph has documented. Reforming these curricula requires not only the addition of new content modules but a fundamental rethinking of how professional identity is formed during training. Professionals who have never been asked to engage seriously with disciplines outside their own are unlikely to practise the cross-sectoral collaboration that sustainable ageing demands, regardless of how clearly policy frameworks mandate it. Postgraduate and continuing professional development programmes offer a more immediately feasible entry point: intensive interdisciplinary training that brings together social workers, GPs, community nurses, housing officers, and digital inclusion practitioners around shared case material drawn from the real complexity of ageing in Slovak communities could begin shifting professional cultures within a shorter timeframe than undergraduate curriculum reform allows. The Slovak–Norwegian research collaboration underpinning this monograph itself demonstrates that interdisciplinary exchange across national boundaries generates analytical insights that neither partner could produce independently, suggesting that international academic

partnerships should be institutionalised as a structural feature of ageing research rather than depending on individual researchers' initiative.

CONCLUSION

This monograph has examined sustainable ageing from integrative and multidisciplinary perspectives, bringing together theoretical frameworks, demographic evidence, empirical investigations, and policy analysis to advance understanding of one of the most significant societal transformations of the 21st century. Across eight chapters, a coherent picture has emerged: the challenges of population ageing are not merely demographic or fiscal, but deeply structural, reflecting how societies organize care, distribute resources, design institutions, and value the contributions of older adults.

The conceptual foundations laid in Chapters 1 and 2 established that ageing cannot be adequately understood through any single disciplinary lens. The integrated model of ageing paradigms synthesises thirteen distinct conceptual frameworks, from active and healthy ageing to sustainable and innovative ageing, into four interconnected domains: Individual-Centred, Society-Centred, Cultural-Spiritual, and Systems Integration. This synthesis reveals that optimal ageing outcomes emerge not from isolated interventions but from the dynamic interaction between personal capacities, social structures, cultural values, and systemic conditions. No single framework captures the full complexity of ageing as lived and experienced; what is required is precisely the kind of integrative, multidisciplinary approach this monograph has sought to model.

The analysis of health systems and preventive strategies in Chapter 3 demonstrates that the public health infrastructure underpinning sustainable ageing extends far beyond healthcare delivery. It encompasses the full architecture of prevention, health promotion, and population health management. The chapter established that preventive expenditure is a stronger predictor of population health outcomes than curative spending, and that each additional unit invested in prevention yields a higher marginal return than equivalent investment in treatment. Evidence consistently shows that the majority of public health interventions are cost-effective, and national-level legislative measures tend to offer some of the highest returns on investment. The analysis of healthcare financing models revealed that countries with universal, tax-financed systems tend to achieve higher efficiency scores and more favourable health outcomes, while the System of Health Accounts 2011 expenditure

classification exposed a critical structural gap: countries in Central and Eastern Europe, including Slovakia, allocate less than 10% of their preventive expenditure to information, education, and counselling programmes (HC.6.1), despite evidence that lifestyle factors account for approximately 40% of health outcomes. Slovakia's chronic underinvestment in preventive care, allocating merely 0.8% of total healthcare expenditure to prevention compared to a European average of 2.6%, and approximately 0.05% of GDP against an evidence-based optimum of 1.175%, stands as one of the most consequential policy deficits identified in this monograph, with directly measurable consequences in avoidable mortality rates that exceed those of neighbouring countries with comparable or lower overall healthcare spending.

The demographic and economic analysis of Chapter 5 provided the quantitative foundation for understanding the pace and intensity of change. Slovakia's old-age dependency ratio grew at more than double the EU-27 rate between 2015 and 2024, and Eurostat projections indicate that 31.3% of Slovakia's population will be aged 65 and above by 2060. The comparison with Norway throughout this analysis is instructive not as an argument for direct policy transplantation, but as empirical evidence that institutional design choices in pension systems, labour markets, digital infrastructure, and preventive healthcare produce measurably different outcomes for ageing populations even when demographic pressures are structurally similar. The chapter further demonstrated that digital exclusion operates as an economic barrier across the life course, with technostress accumulating in mid-career workplaces and translating into premature labour market exit, reduced pension entitlements, and diminished economic participation in retirement.

The phenomenological investigation in Chapter 4 brought the human dimension of these structural analyses into sharp relief. Older adults in Slovakia experience their autonomy as profoundly fragmented: highly competent in familiar domestic domains, yet systematically excluded from institutional, bureaucratic, and digital environments that increasingly mediate access to essential services. This fragmentation is not an inevitable consequence of biological ageing but a product of structural design, of systems built around assumptions of technological fluency and cognitive speed that do not reflect the heterogeneous realities of an ageing population. The central finding that

older adults experience home as the primary space of autonomy and control has direct implications for social services policy, reinforcing the imperative of community-based, ageing-in-place approaches over residential institutionalisation.

The two empirical investigations of Chapter 6, the technostress survey across Slovak and Polish enterprises and the consumer behaviour survey among 121 older people in the Banská Bystrica region, provided quantitative grounding for the qualitative findings of Chapter 4 and revealed a life-course continuum of digital exclusion.

Technostress accumulates in mid-career workplaces where fewer than one in three enterprises has effective prevention measures; digital confidence erodes through the retirement transition; and consumer digital exclusion intensifies progressively with age, reaching 77.3% internet non-usage among respondents aged 81 and above. Together, these findings demonstrate that digital exclusion is not a problem that begins at retirement but an accumulating disadvantage whose origins lie in inadequately supported workplace digitalisation decades earlier.

The integrated policy framework proposed in Chapter 7, structured around four pillars of individual empowerment and health, economic sustainability, social inclusion, and technological integration, translates the monograph's empirical findings into actionable guidance. The framework's central insight is that sustainable ageing cannot be achieved through any single policy domain. Pension reform without digital inclusion leaves older workers unable to remain productively employed. Community care investment without retail and service accessibility leaves daily autonomy incomplete. Health system adaptation without preventive reorientation, and without the kind of strategic reallocation of preventive expenditure towards behavioural modification and health education programmes that the evidence from Chapter 3 supports, addresses consequences rather than causes. Effective policy requires genuine cross-sectoral coordination, participatory design with older adults as co-producers rather than passive recipients and sustained political commitment across electoral cycles.

The interdisciplinary synthesis offered in Chapter 8 identified three convergent mechanisms operating across all empirical and theoretical evidence: the compounding logic of exclusion, through which disadvantage in one domain amplifies disadvantage in

others across the life course; the structural production of dependency, through which institutional design rather than biological decline generates the passivity and helplessness that ageing populations are mistakenly assumed to embody inherently; and the bidirectionality of ageing and society, through which demographic change and institutional responses continuously shape each other across generations.

Taken together, the findings of this monograph support a fundamental reorientation in how ageing is understood and addressed. Older adults are not a demographic burden to be managed but citizens with ongoing competence, contribution, and rights whose potential is systematically undermined by institutions designed without them in mind. Sustainable ageing is achievable, but only through the kind of integrated, evidence-based, and genuinely participatory approaches that the evidence assembled here has mapped. For Slovakia, facing one of the most rapid demographic transitions in Europe with a compressed timeline for institutional adaptation, the urgency of this reorientation cannot be overstated. The evidence from Chapter 3 makes clear that the fiscal cost of continued underinvestment in prevention will far exceed the cost of strategic reallocation, while the evidence from Chapters 4, 5 and 6 demonstrates that the economic, digital, and social dimensions of exclusion are too deeply interconnected to be addressed through siloed policy responses. For Norway, and for societies at every stage of the demographic transition, the lesson is the same: the decisions made today about how to design systems, allocate resources, and value older lives will determine the quality of ageing for generations to come.

As with any research undertaking of this scope, the findings and conclusions presented here must be read with awareness of their limitations. The qualitative investigation of Chapter 4, while rich in analytical insight, draws on a sample of older adults who were already socially engaged through community clubs across four Slovak regions, and therefore does not capture the experiences of the most isolated, institutionalised, or cognitively impaired members of the ageing population, precisely those whose self-efficacy may be most severely compromised. The consumer behaviour survey of Chapter 6, while statistically robust within its regional scope, was conducted in a single Slovak region and cannot be assumed to represent the full diversity of urban, rural, and post-industrial communities across Slovakia. The technostress survey,

similarly, was limited to employees in internationally operating enterprises in Slovakia and Poland, and its findings may not generalise to the small and medium enterprise sector that employs the majority of Slovak workers. The demographic and economic analysis of Chapter 5 draws on the best available Eurostat and national statistical data, but projections to 2060 carry inherent uncertainty that increases with the projection horizon. The cost-effectiveness evidence reviewed in Chapter 3, while drawing on well-established international systematic reviews, has not been validated through primary research within the specific Slovak institutional and financing context, and the transferability of return-on-investment estimates across different healthcare system configurations requires further investigation. Taken together, these limitations do not undermine the monograph's central arguments, which are supported by convergent evidence across multiple independent investigations, but they do point towards the research agenda outlined in Chapter 7 as a necessary continuation of the work begun here. Longitudinal, nationally representative, and intersectional research designs would substantially strengthen the empirical foundation on which the policy framework rests.

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Authors

PhDr. Miroslava Tokovská, PhD.	(4,0 AH)
PhDr. Andrea Seberíni, PhD.	(3,0 AH)
Mgr. Jana Šolcová, PhD.	(3,0 AH)

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Reviewers:

Prof. Dr. Ryszard Sadowski, Rev. PhD., Dsc.
doc. PhDr. Soňa Šrobárová, PhD., MBA
PaedDr. Tímea Šeben Zaťková, PhD.

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About the authors:

Miroslava Tokovská, PhD.,

an expert in public health and social sciences, focuses on multidimensional perspectives of ageing populations, conceptual frameworks of ageing, health management, preventive strategies, health equity in ageing populations and the sustainability of health systems. Miroslava explored how public health interventions can support healthy ageing and the implications for ageing societies.

Andrea Seberíni, PhD.,

a social scientist with expertise spanning the social, psychological and economic dimensions of ageing, brings important insights into the multidimensional implications of ageing populations. She analyses the sustainability of current ageing support systems from an interdisciplinary perspective, integrating social and psychological approaches with economic analysis to propose innovative models for supporting ageing populations.

Jana Šolcová, PhD.,

a social worker and researcher, has a crucial ground-level understanding of individual and community needs, social support systems, and direct service delivery. Her practical experience in activating ageing individuals and families, as well as mobilising the community for community care, can be incorporated into policy recommendations and implementation strategies. These strategies can address issues of social justice, community integration, and the practical challenges of implementing sustainable ageing initiatives.

