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Quantum and tempo of population ageing process in the twelve countries of the former Soviet Union: Challenges, opportunities and public policies

Doctoral thesis

Rozsah a časování procesu populačního stárnutí ve dvanácti zemích bývalého Sovětského svazu: problémy, příležitosti a veřejné politiky

Disertační práce

Vedoucí dizertační práce / Supervisor: RNDr. Tomáš Kučera, CSc.

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Declaration

I declare that this Doctoral Thesis has been composed solely by myself using the cited sources of information and literature. This work, or substantial part of it, has not been submitted for any other academic degree.

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Prohlašuji, že jsem tuto disertační práci zpracovala samostatně s využitím informačních zdrojů a literatury, na které odkazuji. Tato práce ani její podstatná část nebyla předložena k získání stejného nebo jiného akademického titulu.

In Prague / V Praze

Marta Mustafina

Dedication

I dedicate this work to my grandmother. She never stopped learning throughout her long life.

Это для тебя, няняйка.

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Quantum and tempo of population ageing process in the twelve countries of the former Soviet Union: Challenges, opportunities and public policies

Abstract

Population ageing is an omnipresent phenomenon which brings along unprecedented challenges to socio-economic development, especially to employment, social security and public health sectors. The broad goal of this doctoral thesis was to demonstrate that it is time to recognize the importance of population ageing and its dynamics even in the countries with relatively young population structures and to take urgent action through implementation of corresponding policy interventions in order to mitigate and eliminate the upcoming negative consequences and utilize potential opportunities. Research on population ageing in both more and less developed countries is abundant. However, amidst numerous studies, countries of the former Soviet Union remain largely overlooked. Besides, the quantum and tempo of population ageing have not been adequately addressed in the existing literature worldwide. This research addresses, to the best of our knowledge for the first time, those issues.

Holistic approach to gap analysis was adopted to guide this study. The analysis was performed in three steps. The first step incorporated the identification and analysis of the observed and projected demographic trends in the twelve post-Soviet countries. Quantum and tempo of population ageing was estimated using the new indicator proposed in this study delimiting the process into two main phases based on the proportion of older population.

The results indicate that the highest quantum and tempo is expected to be experienced by Azerbaijan during the first phase and the lowest quantum and tempo is already being experienced by Moldova, Russia and Ukraine during the first phase as well. The homogeneity of the studied countries in the context of population ageing was analysed through hierarchical agglomerative clustering using Ward's linkage. The results show that the timing and extent of age-sex structural shifts taking place during the first phase of population ageing process are closely related and are, on average, more pronounced in Asian countries (excluding Georgia) which are expected to undergo the ageing process with higher quantum and tempo compared to European countries (as well as Georgia) where the ageing process has commenced earlier and with a considerably lower quantum and tempo. During the second phase of ageing, however, the twelve studied countries are projected to experience analogous quantum and tempo of the process.

Within the second step of gap analysis, selected health and social sectors were analysed to identify the already existing and upcoming challenges of population ageing and confronting them to the existence of related policy action in the studied countries. The results reveal a positive correlation between the pace of demographic changes and the extent of the observed and upcoming ageing related challenges in the post-Soviet countries. The countries which have nearly completed the first phase of population ageing with low quantum and tempo have started experiencing the challenges in health and social sectors. With rapid pace of demographic change estimated to take place during the second phase of ageing in European countries and both phases in Asian countries, however, countries are expected to face greater challenges in health and social sectors analysed in this study.

The analysis has also revealed that major concern about population ageing at the state level among the studied countries does not translate into adoption of clearly formulated comprehensive policy measures related to population ageing. Higher quantum and tempo of ageing during the first phase is associated with weaker policy action.

The final step of gap analysis encompassed ageing related public policy recommendations formulated based on the identified demographic trends and health and social challenges. This research calls for the constructive dialogue between scientists and policy makers and emphasizes the importance of policy action informed by rigorously analysed data from all relevant sectors.

Keywords: population ageing, quantum, tempo, former Soviet Union, challenges, opportunities, public policy

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Rozsah a časování procesu populačního stárnutí ve dvanácti zemích bývalého Sovětského svazu: problémy, příležitosti a veřejné politiky

Abstrakt

Stárnutí populace je všudypřítomným fenoménem, který s sebou přináší nebývalé výzvy a zároveň příležitosti v oblasti sociálně-ekonomického rozvoje, a zejména pak v oblasti systémům zaměstnanosti, sociálního zabezpečení a veřejného zdravotnictví. Hlavním cílem této dizertační práce je prokázat, že proces demografického stárnutí a jeho dynamika v zemích s relativně mladou populační strukturou jsou aktuálními jevy a že je nutné již nyní přijímat a implementovat odpovídající opatření veřejné politiky, která by vedla ke zmírnění a eliminací negativních důsledků tohoto procesu, stejně jako k využití potenciálních rozvojových příležitostí s tímto procesem spojených. Stárnutí obyvatelstva a jeho důsledkům je odborné literatuře věnována poměrně značná pozornost již několik desetiletí, nicméně země bývalého Sovětského svazu jsou v tomto kontextu poněkud přehlíženy. Stejně tak není věnována odpovídající pozornost otázkám rozsahu a časování procesu stárnutí populace. Doktorský výzkumný projekt, na základě kterého tato práce vznikla, řeší podle našich nejlepších znalostí tyto otázky v daných věcných souvislostech vůbec poprvé.

Hlavní metodologický rámec našeho výzkumu představuje holistický přístup v rámci rozdílové analýzy (gap analysis). Odpovídající metodologické principy přitom byly aplikovány ve třech krocích. První krok zahrnoval identifikaci a analýzu recentně pozorovaných a prognózovaných trendů populačního vývoje ve dvanácti postsovětských republikách. Rozsah a časování stárnutí populace přitom byly hodnoceny pomocí nového indikátoru navrženého v rámci tohoto výzkumu, který rozděluje proces stárnutí do dvou základních fází, a to s ohledem na velikost podílu populace ve vyšším věku.

Získané výsledky naznačují, že nejvyšší rozsah a časování změn lze očekávat v Ázerbájdžánu v průběhu první fáze, a naopak nejnižší parametry vývoje již vykazují Moldavsko, Rusko a Ukrajina také v průběhu první fáze. Homogenita souboru sledovaných zemí z hlediska průběhu stárnutí populace byla testována za použití metody hierarchického shlukování při použití Wardovy metody. Podařilo se přitom prokázat, že rozsah a rychlost strukturálních změn podle věku a pohlaví, ke kterým dochází během první fáze procesu stárnutí populace, spolu úzce souvisejí a jsou v průměru výraznější v asijských (s výjimkou Gruzie), než v evropských post-

sovětských zemích. Proto je na místě očekávat, že proces stárnutí v těchto asijských zemí vykáže větší rozsah i dynamiku ve srovnání s evropskými zeměmi či Gruzií, v jejichž případě proces stárnutí začal dříve, trval déle, a logicky tak vykázal či vykazuje menší rozsah a dynamiku. Ve druhé fázi populačního stárnutí však lze odůvodněně očekávat, že všech dvanáct zemí vykáže obdobný rozsah i časový průběh tohoto procesu.

V rámci druhého kroku rozdílové analýzy byly analyzovány vybrané zdravotnické a sociální oblasti s cílem identifikovat již existující či očekávané výzvy související se stárnutím populace a konfrontovat je s existencí odpovídajících politických opatření v jednotlivých zemích souboru. Získané výsledky odhalily pozitivní závislost mezi rozsahem a časováním demografických změn na jedné straně, a počtem a velikostí pozorovaných a očekávaných výzev souvisejících se stárnutím v postsovětských zemích. Země, které již téměř dokončily první fázi stárnutí populace, začaly čelit výzvám ve zdravotnictví i sociálních sféře. S rychlým tempem demografických změn v druhé fázi stárnutí populací dotčených evropských zemí a obou fází stárnutí obyvatelstva asijských zemí, se však očekává, že tyto země budou čelit dalším, a to dokonce ještě výraznějším výzvám.

Provedené analýzy zároveň odhalily, že ani značné obavy ze stárnutí populace obvykle nevedou k přijetím adekvátních, jasně formulovaných a dostatečně komplexních politických opatření. Větší rozsah a dynamika stárnutí během první fáze jsou naopak spojeny s nižší politickou aktivitou.

Poslední krok rozdílové analýzy, tak jak jsme ji aplikovali, spočíval ve formulaci návrhu opatření veřejné politiky v oblasti stárnutí, a to na základě identifikovaných demografických trendů a výzev v sociální a zdravotní oblasti. Další výzkum se neobejde bez konstruktivního dialogu mezi vědci a tvůrci politik a zdůraznění významu opatření veřejných politik vycházejících z důkladné analýzy a prognózy vývoje v jednotlivých relevantních sektorech.

Klíčová slova: populační stárnutí, rozsah, časování, bývalý Sovětský svaz, problémy, příležitosti, veřejná politika

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CONTENTS

LIST OF ABBREVIATIONS

CFSNS	Comprehensive Food Security and Nutrition Survey
DALY	Disability-adjusted life year
DHS	Demographic and Health Survey
EC	European Commission
ECE	Economic Commission for Europe
EU	European Union
HALE	Healthy life expectancy
HCE	Health care expenditure
ILO	International Labour Organization
IOM	International Organization for Migration
ISSA	International Social Security Association
LDCs	Less developed countries
LEB	Life expectancy at birth
LHE	Lost healthy years
LSMS	Living Standards Measurement Study
MDCs	More developed countries
MICS	Multiple Indicator Cluster Survey
MIPAA	Madrid International Plan of Action on Ageing
NCDs	Noncommunicable diseases
NGO	Non-governmental organization
OADR	Old-age dependency ratio
PSR	Potential support ratio
RHS	Reproductive Health Surveys
TFR	Total fertility rate
UHC	Universal health coverage
UN	United Nations
WHO	World Health Organization
WPP	World Population Prospects
YLD	Years lived with disability
YLL	Years of life lost due to premature mortality

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Chapter 1

Introduction

"Learning is an ornament in prosperity,
a refuge in adversity,
and a provision in old age."
Aristotle

1.1 Problem statement and relevance of the research

Population ageing is an essential feature of the demographic trends in the 21st century. The omnipresence of the phenomenon is the direct outcome of a powerful demographic regularity observed in virtually every country of the world – the demographic revolution (Kirk 1996). Declines in mortality followed by the declines in fertility have resulted in a series of transformations in population age structures (Reher 2004). The shifts in age distribution from younger to older ages have resulted in the growth of older population in both absolute and relative terms. Worldwide, there were 728 million persons aged 65 years and over in 2020 which has increased nearly six-fold from 129 million in 1950 and is estimated to more than double to reach 1.5 billion by mid-century and to add another billion of older people by the end of this century. Concurrently, the share of older population aged 65 and over has increased from 5% to 9% during 1950–2020 and is expected to reach 16% by 2050, while by 2100 older individuals are expected to constitute nearly a quarter of the whole population (United Nations 2019b).

The extension of human longevity and increasing number of years lived in full health reflect the achieved advancement in medicine, public health as well as social and economic development. Globally, life expectancy at birth (LEB) has reached 72.3 years in 2020 having increased by as much as 25 years since 1950. Females, on average, live five years longer than males worldwide (United Nations 2019b).

Shifts in age structure reflect in successive changes in essentially all institutions from governments to families and respective timely action serves as a decisive point in the final outcome of the readiness to mitigate potential challenges and risks. The quantum and tempo of population ageing is likewise of key importance since higher pace of the process results in higher

complexity of adaptation to proceeding demographic changes (Lutz, Sanderson and Scherbov 2008).

The latest Demographic Outlook for the European Union starts with the following statement: "Demography matters." (European Parliament 2020). It emphasizes the fact that demography plays a central role in all sectors including labour market, social protection, healthcare, intergenerational solidarity, etc. Population ageing, in particular, has come to occupy the predominant position among the existing demographic issues. A worldwide survey held among demographers in 2009 has revealed that most of the experts consider population ageing to be "the most important population issue" both across the globe and for their country of residence (van Dalen and Hendrik 2012, p. 368).

The demographers started focusing on population ageing in the less developed countries (LDCs) only in the 1980s (Martin and Preston 1994). Today, four decades later, the research on ageing in LDCs is exploding (Sanderson and Scherbov 2007). Amidst a great deal of studies, though, countries of the former Soviet Union remain largely overlooked. Understanding the dynamics of the ageing phenomenon and identifying the potential challenges is crucial for post-Soviet states. Most of those countries are "ageing without living longer" (Botev 2012, p. 70). According to United Nations (2019b) estimates, fertility decline here is not coupled with major improvements in life expectancy, especially among male population. The specific problem is that lack of the ageing scenario assessment and policy action may pose major threats to socio-economic development as well as public health system in the region. As noted by Sidorenko and Zaidi (2013), most of the post-Soviet countries recognized the changes resulting from population ageing as a matter of major concern in 2009, nevertheless adoption of clear strategy with actions was a rare phenomenon. The latest available data from 2015 suggests that the situation has evolved but not in a positive direction, since the number of post-Soviet states considering the issue of population ageing as a matter of major concern has actually decreased from eight to six countries (United Nations 2015b). This doctoral thesis addresses those issues with a holistic approach through gap analysis. The empirical chapters encompass rigorous analysis of the quantum and tempo of population ageing in the twelve countries of the former Soviet Union based on the data for the period 1950–2020 with projected trends until 2100; in-depth analysis of health and social sectors through relevant indicators to identify existing and upcoming challenges of the ageing process; followed by identification and evaluation of existing ageing related policy measures in the twelve countries of the former Soviet Union and concluding with deliberation of policy recommendations based on the existing and potential challenges identified through gap analysis. The structure and results of this research could potentially be used by the studied post-Soviet states as the foundation and starting point for policy action and the underlying research.

1.2 Structure of the research

This doctoral thesis is comprised of ten chapters.

Chapter 1 encapsulates introduction providing background of the study, statement of the problem as well as relevance and importance of this research.

Chapter 2 features literature review assessing the scholarly sources on the topics studied during this research. It analyses the knowledge, relevant theories and existing gaps with regards to the origins of population ageing, i.e., demographic revolution, followed by the determinants and dynamics of population ageing, opinions on the consequences of the ageing phenomenon as well as policy responses.

Chapter 3 describes the theoretical framework. The first section lists the concepts and terminology used throughout the research. The second section outlines the existing theories that serve as the foundation of this study.

Chapter 4 identifies the goal of this thesis and its objectives followed by the formulation and justification of research questions and corresponding hypotheses.

Chapter 5 outlines data sources of this research followed by the evaluation of used data quality.

Chapter 6 specifies the methodological approach adopted in this study and explains how the data was analysed.

Chapter 7 consists of three sub-chapters analysing the transformations of demographic structures in the twelve countries of the former Soviet Union during the period 1950–2100. The first sub-chapter focuses on demographic determinants of the ageing process examining the decline in fertility, increases in life expectancy and the role of migration. The second one evaluates age-sex structure changes including the assessment of population pyramids, old-age dependency ratios and imbalances in the sex structure of older population observed in post-Soviet countries. The third sub-chapter analyses the homogeneity and heterogeneity of the studied countries in terms of the quantum and tempo of the ageing processes.

Chapter 8 consists of two main blocks. The first one identifies and analyses the imminent challenges and risks associated with population ageing in the twelve post-Soviet states through the most affected areas including public health, employment, social protection and ageism. The second block determines the lengths of the windows of opportunities in the studied countries resulting from demographic revolution as a potential to seize the demographic dividend and mitigate the negative consequences of the ageing process.

Chapter 9 begins with the analysis of the international policy framework on population ageing. Then, the magnitude of public policy response to existing and impending challenges of ageing populations in the studied countries is examined and assessed through gap analysis and research-based policy recommendations are proposed in the concluding section.

Chapter 10 summarizes the results of the research and discusses its limitations. This doctoral thesis concludes with recommendations for future research.

Chapter 2

Literature review

2.1 Origins of ageing: Demographic revolution

The world has just experienced a demographic milestone – the number of young children (under the age of 5 years) has been, for the first time in history, outnumbered by the older population (65 and over) (He, Goodkind and Kowal 2016; National Institute on Aging and World Health Organization 2011; United Nations 2019b). The process of population ageing is known to be the direct outcome of the demographic transition or revolution (in this study we prefer the term "demographic revolution", while "demographic transition" is used when referred to as a "process" and "theory") as referred to by some of the scholars. The development patterns of historical and contemporary transitions are essential in understanding the outcomes of changes in population age structures.

In classic literature, Frank Notestein is considered to be the founder of the demographic transition theory who described the reasons of fertility decline in his article published in 1945 (Caldwell 1976). Though, it is Adolphe Landry who was the first to use the term in his book "La Révolution Démographique" published in Paris in 1934 (Kirk 1996). If following chronological path, the model of demographic transition, however, was first formulated by Warren Thompson as early as in 1929 specifying three different types of countries based on their rates of population growth (Kirk 1996; Pavlik 1980). According to Kirk (1996), the typology of Thompson received the recognition in the English literature only 15 years after its publication while Landry developed the same ideas in his aforementioned work in 1934 but did not seem to be familiar with Thompson's work. Both works described the three stages of the demographic transition model as we know it today.

Before the demographic revolution that started in Europe during the end of the 18th century life was short with high fertility and high mortality resulting in slow growth and young population (Dyson 2010; Lee 2003). The first real explosion of population growth occurred during the Industrial Revolution and cultural advancement of the human society. European population which

numbered around 100 million back in 1650 increased to approximately 700 million in 1933, constituting a remarkable seven-fold population growth in three centuries which spread around the world further on as a result of migration (Davis 1945). As neatly noted by Davis (1945, p. 1), "viewed in long-run perspective, the growth of the earth's population has been like a long, thin powder fuse that burns slowly and haltingly until it finally reaches the charge and then explodes".

The demographic revolution is universal. Every country in the world will at some point experience declining mortality and fertility changes. Despite its ubiquitous nature, the process of transition has distinctive scope and dynamics which depend on the country's historical, cultural, socio-economic and other circumstances. The most significant common characteristic with no exception, as noted by Reher (2004), is that the decline in mortality has always preceded the reduction in fertility. Followed fertility decline leads to a series of transformations in population growth rates and age structures.

There is no common opinion regarding the origin of mortality declines at initial stages of the demographic transition process. According to Davis (1945), mortality decline was a result of improving agricultural techniques and more so the development of transportation which reinforced production and commerce. Pavlik (1980) connected the dots with the progress in medical science, improved hygiene and higher living standards. Kirk (1996) in his turn, saw the development of modern state as a decisive influence in initial mortality reduction arguing that foundation of public order reduced deaths from violence and wars. Being an economist, Kuznets (1973) put economic growth at the forefront of mortality decline causes. Social, political, economic, and health factors are interconnected and do not develop in isolation which lets us to conclude that all of the mentioned factors contributed to mortality decline to their own extent from one country to another. As stated by Kirk (1996, p. 369), "it would be fatuous to consider a single cause, and focus on it as the only cause".

The origin of fertility decline seems to be harder to explain. Some scholars including Caldwell (1976), Kirk (1996), Landry (1987) and Pavlik (1980) indicate that fertility decline in the course of the demographic revolution occurs under numerous factors which is practically impossible to estimate. Dyson (2010), Reher (2004) and Vishnevsky (2017), on their turn, mention mortality decline as a fundamental cause of decline in fertility in both developed and developing countries. Anatoly Vishnevsky made an extensive analysis of the fertility decline factors in his work named "Unsolved problems in the theory of demographic revolution" published in 2017. He argued that "from the very beginning, it was clear to the theorists of the demographic revolution that the decline in fertility was a response to decline in mortality, but for some reason this explanation seemed to be inadequate to them" adding that "most demographers have miraculously not been and are still not aware of the contradictions of their own theoretical constructions" (Vishnevsky 2017, p. 143, 145).

In 1986, a new concept of the "second demographic transition" was proposed by Ron Lesthaeghe and Dirk van de Kaa in a Dutch journal Mens en Maatschappij (van de Kaa 2008). In the English version published in 1987, van de Kaa suggested that starting from around 1965, Europe experienced a new stage of transition characterized by individualistic norms and attitudes (van de Kaa 1987). The key difference between the first and the second demographic transitions,

as stated by the author, is the shift from dominance of concerns for family and offspring to emphasis on the self-fulfilment and the rights of individuals. Industrialization along with urbanization initiated the shift from family-based production to wage-based labour and resulted in "reduced economic utility of children" (van de Kaa 1987, p. 5). This new concept did not receive unanimous recognition form demographers who expressed their criticism of the so called "second demographic transition". Pavlik (1998) and Vishnevsky (2017) justify the existence of a single "demographic revolution". Coleman (2004) recognized it as a great description of new lifestyle preferences of the modern society though the concept is rather "secondary" than "second" and cannot be termed neither as "demographic" nor as a "transition".

The transition theory comprises all demographic findings striving to explain changes in the levels of fertility and mortality and can serve as a predictive force of future population development. Failure to understand the very process and its roots may lead to misleading forecasts and interpretations (Pavlik 1980).

2.2 Determinants of population ageing

Demographic revolution leads to inescapable changes in the age structures that result in the ageing of population. Omnipresence of demographic revolution entails worldwide scale of population ageing. Each country will eventually experience the phenomenon of population ageing and its consequences. Unprecedented in recorded history, population ageing is determined by increasing longevity, declining fertility along with shifts of large cohorts to the older ages (Bloom and Luca 2016). The inception of broadening concern about population ageing and its effects goes back to the time of establishment of the United Nations Commission on Population and Development in 1946 (Mirkin 2005). While governments did not proceed with implementation of policy actions, it was nevertheless an important breakthrough in raising awareness of population ageing and its aftermath.

What is the main driver of population ageing process? While it is widely acknowledged that mortality decline is the first driving force behind the process of demographic transition, the opinions regarding the main determinant of population ageing are not quite consensual. The early reference of age-structural determinant often associates with Coale (1956) who, using a stable model, concluded that it is fertility decline what occupies the predominant role in the process of population ageing. Coale attributed quantitative importance to fertility as a decisive factor in the age structure variation based on the account of fertility and mortality ranges around the world. The author indicated that "a lower course of fertility produces an older population than would a higher course, all factors being the same" and "most mortality improvements in the past have produced a younger population than would have resulted from unchanged mortality" (Coale 1956, p. 114). Bengtsson and Scott (2010) repeated Coale's estimates using Swedish data for the entire 20th century. Their results confirmed that fertility decline was the primary determinant of population ageing in Sweden throughout the century. Further empirical evidence on the dominant role of fertility, though, is scarce.

Although the above conclusion remains to be a classical view on the primary determinant of population ageing, mortality improvement is gaining its recognition as an increasingly important driver in the ageing process (Murphy 2017). As noted by Preston, Christine and Mitchell (1989), stable model has undoubtedly been essential in revealing the origin of long-term age-structure changes overall, but it demonstrates limited applicability when it comes to discussing the conditions responsible for the ageing process in a given population at a particular moment in time. Similar to Coale (1956) and Bengtsson and Scott (2010), the authors (Preston, Christine and Mitchell 1989) also analysed the contribution of fertility, mortality and migration changes in Swedish population during the period 1980–1985 and came to a drastically opposite conclusion. Based on their results, the largest contributor to population ageing in Sweden was mortality decline which accounted for nearly 60% and 54% of increase in the mean age for females and males respectively. A year later, Caselli and Vallin (1990) using the French and Italian data for the period of 1952–1986 and projections for 1986–2040 came to an analogous conclusion that the ageing effect of mortality change is sometimes more important than fertility change. Their results showed that even if low total fertility rate (TFR) of 1.4 live births per woman is preserved until the year 2040, more than 50% increase in the proportion of the population aged 60 and over would be due to mortality decline. Among more recent empirical evidence, Preston and Stokes (2012) examined the role of demographic factors in population ageing based on age-specific growth rates during the period 2005–2010. The authors made an important distinction by analysing more developed countries (MDCs) and less developed countries (LDCs) (based on United Nations (UN) definition) separately. Their results demonstrated that substantial improvement in survivorship from one cohort to the next contributed to a far greater extent to the process of population ageing in comparison with birth rate declines in MDCs, at 82% versus 23% accordingly. In LDCs, the main contributing power behind population ageing was found to be the change in mortality as well. Sudharsanan and Bloom (2018) have elaborated on the matter analysed by Preston and Stokes in 2012. The authors focused on the period 1970–2015 extended by low, medium and high variant projections up to 2050 using the line-integral decomposition method and concluded that fertility decline is expected to make significant contributions to population ageing only in Africa and low-income countries (based on World Bank income groups definition) while in other regions "continued ageing of large cohorts" is estimated to become the main driver.

When it comes to replacement migration, numerous research results have shown that it is not a solution to reverse population ageing process. Back in 1998, Lesthaeghe, Page and Surkyn, based on the analysis of Europe, alleged that immigration cannot revert neither population decline nor population ageing in the first half of the 21st century, unless colossal numbers of migrants arrive annually (Lesthaeghe, Page and Surkyn 1998). Based on the three scenarios (zero-net migration, constant population size across the 2000–2050 period, and rising population size), Vishnevsky (2000) carried out the projections for Russian population and concluded that replacement migration can hardly be relied on in terms of neutralizing the adverse consequences of current demographic trends. A comprehensive study on replacement migration by United Nations (2001) analysed the effects of replacement migration on the population size and age-

structure in eight developed countries with a common fertility pattern below the replacement level. The results were equivalent, revealing that the levels of international migration necessary to offset the process of population ageing are extremely high: the European Union (i.e., EU–15) would require the influx of 674 million immigrants to maintain the support ratio constant until 2050 (United Nations 2001). Craveiro et al. (2019) have revisited the UN study on replacement migration nearly two decades later. The authors analysed Western and Southern European countries using conventional and prospective-age limits for the period 2015–2060 and concluded that replacement migration may play a certain role in offsetting the population decline, however, it cannot reverse the ageing process. Having examined to what extent migration could be a solution to population decline and ageing in Czechia, Burcin, Drbohlav and Kucera (2005, 2007) inferred that population size constancy could be reached somewhat easily since the volume of required net-migration compared to the existing migration balance of the country. Albeit, to offset age-structure changes occurring as a result of the ageing process is "de facto impossible even in a short-term perspective since the estimated needs in net-migration inflows stay fully outside any reality" (Burcin, Drbohlav and Kucera 2005, p. 65). To conclude on this topic, "there are no feasible migration solutions to the age-structure change" as stated by Coleman (2002, p. 594).

Age structure is the paramount demographic characteristic of a population (Káčerová, Ondačková and Mládek 2014). The complexity of population age structure is the product of interaction among the processes of fertility, mortality and migration which is essential in understanding both demographic and social changes occurring within a population (Bloom et al. 2007; Ofori-Asenso et al. 2018). At early stages of demographic transition populations have a very young age structure which changes when they move along towards later stages. Consequently, those countries who have completed the process of demographic transition acquire a transformed age structure with a growing proportion of older individuals. The expansion of the proportion of older population aged 65 and over from 7% to 14% signalizes the shift from relatively young to older population structure (Harper 2011; Kinsella 2000).

The demographers became interested in age distributions of populations around 1900 (Schmid 1998). Gustav Sundbärg, a Swedish demographer, developed the well-recognized age structure classification distinguishing three principal types: progressive, stationary and retrogressive (S. R. 1907). Following the classification, in nearly all populations about half of the individuals belong to the age group of 15–49 years and the patterns differ with regards to younger and older population proportions. Typical for early stages of the demographic transition, progressive age structure is determined by a higher proportion of approximately 40% of persons aged 0–14 years and a significantly lower proportion of around 10% aged 50 and over. Stationary type with nearly equivalent proportions of children aged 0–14 years as well as people aged 50 and over characterizes countries midway through the transition process. Retrogressive population structure (with 20% and 30% of persons aged 0–14 years and 50 and over respectively) can be observed at the final stage of the transition process.

The population pyramid is one of the most adequate and popular approaches to analyse age and sex structure of a population (Gavrilov and Heuveline 2003; Wilson 2016). The increase in the proportion of older population in light of population ageing leads to top-heavy age structures

with a shrinking base of the pyramid (Reher 2015; Vishnevsky 2017). Pison (2009), though, argues that the term "population pyramid" is no longer an accurate name for this type of visual representation as with the ageing process, population age structures look more like a "pipe" or a "spinning top". Wilson (2016) has introduced a new "components-of-change population pyramid" which according to the author aids in a more in-depth understanding of any given population age structure. It is achieved through an immediate visual illustration of demographic drivers of the ageing process on the left of the pyramid and the age structure on the right. The proposed new type of the pyramid, however, does not allow to study the age-structural differences by sex unlike the traditional one.

2.3 Dynamics of population ageing

Age-structural transformations driven by unprecedented changes in fertility, mortality and migration result in varied quantum and tempo of the ageing process (He, Goodkind and Kowal 2016; Schoeni and Ofstedal 2010). As remarked by Lutz, Sanderson and Scherbov (2008), the speed of population ageing is critical, in addition to shifts in its level because higher speed implies predominantly more difficulties of adaptation to arising demographic changes.

Majority of the demographers use conventional measures of population ageing acknowledging their relevance and accuracy. Meanwhile, a number of new alternative estimates and approaches have been proposed mainly based on the notion of tempo effects introduced by Ryder (1964). Among these, tempo adjusted TFR, which, as stated by Bongaarts and Feeney (1998), measures the quantum component by eliminating the tempo distortion from the conventional TFR occurring due to timing changes. Later on, Bongaarts and Feeney (2003, p. 13127) introduced alternative measure of life expectancy that "depends both on the force of mortality function and on the rate of change in the standardized mean age at death" and is relevant for populations with high life expectancy. Sanderson and Scherbov (2005) proposed forward-looking definition of age. This new paradigm in conceptualizing the process of ageing was later defined by the authors as the "characteristics approach" (Sanderson and Scherbov 2013). Some researchers including Balachandran et al. (2020), Guillot (2006), Luy (2010) and van Imhoff and Keilman (2000) have, however, criticized those alternative measures arguing that the new approaches and indicators are not straightforward measures which can only be used in specific scenarios and require further deliberation as a result.

Schmid (1998) and Stolnitz (1994) distinguish four models of the ageing process based on its tempo in Economic Commission for Europe (ECE) member countries. Post-Soviet countries analysed in this study are simultaneously covered by ECE. The models are defined in the following way:

1) A model of sharp ageing determined by long-lasting fertility below replacement level and growing longevity. Countries of Western Europe belong to this category as, historically, these were the first nations with lowest fertility manifestations.

2) A second model of sharp ageing but occurring later and with a higher speed. Under this type are the countries of Southern Europe where a rapid birth decline to the lowest levels was observed somewhat later but at an accelerated pace.
3) A model of gradual population ageing based on higher levels of fertility which result in a retarding effect of the ageing process in both absolute and relative terms. Examples include France with its unique higher levels of fertility (compared to other Western countries) and some immigration states where, according to Schmid (1998), the preference for young immigrants has an impact on the delay of an ageing process to some extent.
4) A fourth model of population ageing, observed among European countries of the former Soviet Union, is characterized by a "demographic transitional paradox" with concurrently low fertility and uncommonly high mortality levels.

Literature analysing the quantum and tempo of population ageing worldwide, and in the post-Soviet countries in particular, is scarce. Among the existing studies, Kinsella (2000), Kinsella and Gist (1995) and Kinsella and Phillips (2005) examine 10 selected developed countries along with 10 developing ones. They measure the "speed" of ageing as the number of years required or expected for the proportion of older population aged 65 and over to increase from 7% to 14%. The highest speed was observed in Tunisia and the lowest in France with 15 and 115 years respectively. Lutz, Sanderson and Scherbov (2008) calculate the "speed" of ageing at the global level through both alternative and conventional measures including median age, prospective median age, proportion of population aged 60 and older, and proportion of population in age groups with a remaining life expectancy of 15 years or less. To the best of our knowledge, none of the existing literature analyses the quantum and tempo of population ageing in post-Soviet countries using historical longitudinal data with projected mid- and long-term trends. One of the aims of this study is to fill this significant research gap by proposing the new indicator delimiting the process of ageing into two main phases based on the proportion of older population.

2.4 Doomsday scenario or unprecedented achievement

Population ageing and its consequences are viewed both as threats and a success story. According to van Praag, van Dalen and Lutz (1994), population ageing poses a serious threat mainly due to the following reasons: productivity problem which is age-related and rising dependency ratios which may jeopardize the welfare states. Eberstadt (1997) expressed the concern that the world may become a "global nursing home" as a result of dramatically high proportions of older populations. Coleman (2001) describes the ageing and its problems as "consequences of growing up" and points out that populations with a tradition of family care for the older people will suffer comparatively more. Sigg (2005) emphasizes that social security crisis seems inevitable in light of remarkably high proportions of older populations which continue to rise. Powell (2010) stresses on the fact that the phenomenon will have striking effects on the economy, both local and global. Financial expenditures, total savings and labour supply will be most significantly affected. Having analysed EU panel data between 1995 and 2017, Cristea et al. (2020) have concluded that the lack

of policy action will bring significant challenges to households and public finances and negatively affect labour productivity. Challenges related to economic and physical burden of noncommunicable diseases (NCDs) resulting from population ageing are analysed in Bloom, Mitgang and Osher (2016, p. 5) indicating that "longer lives do not necessarily mean healthier lives". Based on the example of Britain, Shaw (2002) questions the negative prognosis of demographic crisis. They suggest that the notion of crisis has resulted from the fact that the older population is often marginalized from the labour market and from the society as a whole. Hence, the real problem is not the shortage of labour supply not capable to support the elderly population but rather lack of employment opportunities for older individuals.

Murray (2008) provides a more optimistic outlook based on Europe's prognosis. Firstly, the dependency ratios are expected to stabilize by mid-century according to the author and secondly, labour market challenges can be overcome through appropriate measures to avoid demographic crisis. Bussolo et al. (2015) argue that despite the macroeconomic challenges, population ageing creates numerous opportunities to increase quality of education and labour productivity through behavioural responses of individuals and enterprises. In general, most of the authors denote that population ageing is an unprecedented omnipresent phenomenon and it is the timely and appropriate policies that will determine whether countries will age successfully or face the negative outcomes, though doomsday scenarios are likely overstated in any outcome (Gavrilov and Heuveline 2003; Herrmann 2012; O'Loughlin, Browning and Kendig 2017; Walker 2002, 2003; Zaidi 2008).

Understanding the scope of potential negative outcomes related to the ageing process is important. This kind of literature can especially be resourceful for policymakers in order to recognize the full spectrum of areas that can be affected through observed demographic changes. Albeit, policy action has to always be based on rigorous analysis of related indicators in a given country, for a given population and accounting for the regional differences.

2.5 Policy responses

Increasing awareness of demographic trends and their consequences that may become opportunistic or challenging leads to governmental interest in population policy (Malmberg et al. 2006). Population policy represents institutional arrangements or programs set by the governments which influence demographic change both directly and indirectly (Demeny 2003). Since 2002, the Madrid International Plan of Action on Ageing (MIPAA) has become a guiding policy instrument on handling the emerging challenges of population ageing in the 21st century (United Nations 2002). Focusing on the essential areas of health and well-being, ensuring supportive environments and overall development for older persons, MIPAA serves as a fundamental resource of guidance and orientation for policy makers and governments. The third review of MIPAA reported on the analysis and preliminary findings of the emerging issues and pointed to major constraints including scarcity of financial and human resources and lack of recognition of the need for policy action from governments (United Nations 2018). Zaidi (2008) specified that implementation of MIPAA remains uneven across the countries and there is an

absence of monitoring approach on a global level mainly due to the lack of age and sex disaggregated data in LDCs.

Changes in the age structures are reflected in practically all social institutions from governments to families and individuals and how these institutions will act and accommodate themselves to the imminent challenges will define the final outcome of quality of life during the 21st century (Martin and Preston 1994; Pifer 1986). The experts emphasize on the following policy priorities to address the challenges of population ageing:

- Walker (2002, p. 761, 2003) stresses on the point that the key role in elaborating rational policies is elimination of a "climate of panic and alarm about the burden" of the ageing process, arguing that effective policies towards healthy ageing, extended working lives and other strategies intended to extend quality life would not require any fundamental modifications in social protection systems.
- Reinhardt (2003) focuses on the effects on augmented demand for health care and total national health spending mainly through increasing old-age dependency ratio which in its turn will provoke the increase in the unit labour cost of its product. The development of labour-saving technology could reduce traditional reliance of health sector on labour.
- The study of Prskawetz, Mahlberg and Skirbekk (2005) concludes that in European context, for instance, the increase in education and labour force participation rate (LFPR) among older population and in some countries for the young generation and females, are crucial for maintaining productivity growth. The authors specify that the policy focus should be concentrated more on national level rather than regional.
- Scherbov, Sanderson and Mamolo (2014) prioritize LFPR and pension age policies to address the negative consequences of ageing. Their estimations of the trade-offs show that the rise in LFPR by one or two percentage points by the year 2050 can replace one-year increase in the pension age.
- Social innovations, supporting older individuals' sense of dignity and self-worth, rights and abilities to remain active and care for themselves, are imperative according to Sander et al. (2014). The study provides an array of successful examples from around the world. Among those are workshops that promote small business entrepreneurship for retired people in Israel, community gardens encouraging physical and emotional well-being among older generation in the USA, Ayurvedic Laughing Clubs in India, etc.
- Bloom and Luca (2016) accentuate on combination of investment in education and training for all, increase in labour supply for older people, females and immigrants as well as increased savings during working years. They underline that the appropriate mix of measures should conform to varying country contexts.

There is a growing body of research on public policy response to population ageing around the world. Countries of the former Soviet Union, however, are largely overlooked. To the best of our knowledge, apart from country reports on the implementation of MIPAA guidelines, population policy responses in the countries of the former Soviet Union have been analysed to some extent by only few following studies. According to Lutz (2010), new population policy paradigm in the countries of the former Soviet Union should target human capital (in terms of

health and education), social cohesion, national security and identity, and internal and international migration considering the human capital of migrants. Sidorenko (2010) identified priority policy areas in the post-Soviet states during the first five year of MIPAA implementation. Social protection and income security, participation and integration in societal life, and health and medical care were the three most common policy areas prioritized by the countries. Concluding common feature among the countries is the reported insufficiency of national capacities for population policies implementation. Having analysed the demographic transition in Europe and Central Asia, Bussolo et al. (2015) proposed two sets of policy recommendations for the studied countries aimed at achieving "golden ageing". Some of the recommendations, however, do not comply with existing research evidence. Namely, the authors propose to focus policy action towards increasing the level of fertility and implement migration policies directed at attraction of workers and talents from abroad. The positive effect of pronatalist policies is questionable which will be discussed in Chapter 9 while replacement migration cannot reverse the course of ageing as examined in Sub-Chapter 2.2. Based on the analysis of existing ageing related public policies in Kazakhstan, Sidorenko, Eshmanova and Abikulova (2017b) conclude that despite the fact that ageing is recognized as one of the demographic challenges at the state level, strategic approach to address the challenges of the ageing society has not been adopted. Neither has population ageing related issues been included in the Kazakhstan 2050 Strategy defining the main course of overall state development during the coming decades. Mikhailova et al. (2018) discuss the few measures related to population ageing within the Action Strategy for the Benefit of Senior Citizens in the Russian Federation up to 2025. Elizarov et al. (2018) provide general overview of overall demographic and family policy measures adopted in the countries of the former Soviet Union. Finally, Golubeva and Emelyanova (2020) also review the existing policy measures in Russia related to population development and older population in particular. The authors underline the lack of research in core areas related to population ageing in Russia.

Chapter 3

Theoretical framework

3.1 Basic concepts and terminology

This sub-chapter deals with relevant concepts and terminology applied in the study. Unless otherwise cited, basic terminology and concepts are based on UN definitions, and are listed in alphabetical order.

Age structure refers to the composition of the population by age groups.

Ageing population is a population with increasing proportion of older people aged 65 and over. A society where the proportion of population aged 65 and over passes the threshold of 7%, 14% or 20% is considered to be "ageing", "aged" and "super-aged", respectively.

Ageism is "prejudice by one age group toward other age groups" (Butler 1969, p. 243).

Demographic dividend is the low dependency ratio that develops for several decades during the course of the demographic transition. It describes populations that have experienced several decades of fertility decline and contain a large proportion of working-age population relative to children or older people as a result of the early stages of population ageing. This is described as a dividend as it can promote an increase in the investment rate and rapid economic growth.

Demographic revolution/transition is the process by which populations move from high mortality and fertility rates, to low mortality and fertility rates.

Demographic window of opportunity is the period in which the working-age population (aged 15–64 years) is growing while the proportion of young population (aged 0–14 years) falls below 30% and the proportion of older population (aged 65 and over) is still below 15%.

Fertility rate is a ratio of the number of live births to the number of females in a given population.

Healthy life expectancy (HALE) is the average equivalent number of years of full health that an individual could expect to live, subject to the ill-health rates and age-specific death rates of a given period through lifetime.

Life expectancy at birth (LEB) is the average number of years of life expected by a hypothetical cohort of individuals who would be subject during all their lives to the mortality rates of a given period.

More developed countries (MDCs) and *less developed countries (LDCs)* mentioned in this research are grouped in terms of UN definition since the main data analysed in the study is based on the UN 2019 Revision of World Population Prospects. Though, UN does not define those two groups of countries based on development stage. As a result, *MDCs* comprise Australia/New Zealand, all of Europe, Japan and Northern America and *LDCs* include all regions of Africa, Asia (apart from Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

Mortality rate or *death rate* is the frequency of occurrence of death in a given population.

Net migration is the number of immigrants minus the number of emigrants.

Noncommunicable diseases (NCDs) also referred to as chronic diseases, are by definition non-infectious diseases. There are four main types of NCDs including cardiovascular diseases, cancers, chronic respiratory diseases and diabetes (WHO 2018).

Older population does not have a universally accepted definition but the UN uses the threshold of 60 or 65 years. Most of the demographers refer to the population aged 65 and older, so does this study. *Oldest old* is defined as individuals aged 80 years and over.

Population policies are the measures taken by the state and policy makers in an explicit or implicit way aimed at influencing population size, growth, composition and distribution (INED 2020).

Post-Soviet countries studied in this research include Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan, which happened to share seven decades of common history. For consistency reasons, countries are defined geographically as Asian and European based on UN definition of regions. Azerbaijan, Armenia, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan are defined as Asian countries. Belarus, Moldova, Russia and Ukraine are defined as European countries.

Replacement migration is the international migration that a country would need to offset population decline and population ageing resulting from low fertility and mortality rates.

Working-age population is the proportion of population aged 15 to 64 years.

3.2 Theoretical foundation

Despite the fact that demography as a science is abundant in quantification rather than theoretical foundation, it has developed one main theoretical construction – the theory of demographic transition – which integrates historical evolution of demographic processes and their contemporary concepts (Kirk 1996). This research is grounded on the theory of demographic transition. In line with the aim of this study to recognize the importance of population ageing and its dynamics in post-Soviet countries, the demographic transition theory serves as the foundation for understanding the process of ageing.

The demographic transition theory originated as a result of searching for causes of the unusual trends in fertility experienced by the industrialized countries (Vishnevsky 2017). The first attempts to classify populations through patterns of mortality and fertility ware made by Warren Thompson in 1929 and Adolphe Landry in 1934 (Kirk 1996).

Thompson categorized countries into three groups based on the rate of population growth. The first group of countries included Western Europe and countries settled by European immigrants. Those countries experienced low mortality and declining fertility with anticipated population decline. The second group of countries was comprised of Eastern and Southern Europe with low fertility and mortality but where mortality had decreased before fertility and more rapidly. As a result, the rates of natural increase were greater here compared to the first group of countries. The third group of countries had high birth and death rates and were distinguished as Malthusian. According to Thompson's calculations, this group of countries included around 70–75% of population worldwide.

Adolphe Landry also proposed three phases of population development including primitive, intermediate and contemporary stages suggesting that the demographic revolution would eventually spread throughout the world. Landry provided a more extended explanation of the reasons behind mortality and fertility decline. He emphasized that material well-being was no longer the main driving force behind mortality decline. Fertility decline according to Landry was a result of shifting paradigm towards self-fulfilment.

Following the classifications of Thompson and Landry, the theory of demographic transition explaining fertility decline was fully formulated only in 1945 by Frank Notestein (Caldwell 1976). Notestein explained high fertility as a necessity for survival or else very high mortality would have resulted in a population decline or even extinction. In the course of time, mortality started to decline. According to Notestein, the fundamental cause of fertility decline was urbanization which led to transformation of society from traditional large family setting to individualism.

Few years later, Blacker (1947) proposed a five-stage demographic transition model which has become a widely accepted model today. The transition model included: high stationary stage with high birth and death rates; early expanding stage with high birth rates and lower and falling death rates resulting in accelerating population growth; late expanding stage with declining birth and death rates while the death rates are lower than the birth rates resulting in annual population growth; low stationary stage with low birth and death rates; and declining phase with death rates exceeding the birth rates leading to population decline in the absence of compensation by immigration.

Pavlik (1980, 1991) accentuated that the first formulations of demographic transition theory were rather description of fertility and mortality trends with limited theoretical reasoning though they contributed to further development of connecting quantitative demographic processes with qualitative changes of demographic systems. According to the author, the demographic transition is a historic process during which populations experience the changing pattern of social development. Having started in Europe at the end of the Renaissance, demographic transition encompasses transformation of demographic patterns through changes in mortality, fertility and age structure of populations around the world.

The theory of demographic transition has received criticism. Coale (1973, p. 64–5) argued that its weakness is that it is incapable of identifying a "precise threshold (a checklist of essential characteristics, or a combined score on some socio-economic scale) of modernization that will reliably identify a population in which fertility is ready to fall". Vishnevsky (2017) debated

whether the demographic transition theory in its present form can be actually considered to be a theory. The author indicates that a theory cannot be based solely on description of models and stages, and the transition theory as we know it today does not incorporate "modern concepts of the behaviour of complex systems" and should be expanded further in its methodological foundations (Vishnevsky 2017, pp. 136). Despite the criticism, the theory of demographic transition has a strong predictive nature that every country at some point in time would undergo the transition process and its eventual course, with various underlying socio-economic conditions, is similar throughout the world (Coale 1973; Pavlik 1980).

Being the direct outcome of the demographic revolution, population ageing will eventually be experienced by each and every country worldwide. The twelve countries of the former Soviet Union studied in this research are currently undergoing varied levels of demographic change. Based on the transition theory, this research is set to identify and analyse the extent of age and sex structure changes taking place during the ageing process in post-Soviet societies.

The epidemiologic transition theory complements the theoretical foundation of this research. Omran (1971) developed the theory of epidemiologic transition which interprets complex changes in disease and health patterns along with their interconnections with demographic and socio-economic determinants and their consequences. According to the author, the theory resulted from limitations of the demographic transition theory. As noted by Vishnevsky (2017, p. 141), it is the epidemiologic transition theory that accentuated the mortality decline as an independent process which required the analysis of "its internal content". Initially, the epidemiologic transition theory was based on three stages including: the age of pestilence and famine with high mortality and LEB fluctuating between 20 and 40 years; the age of receding pandemics with declining mortality rate and LEB fluctuating between 30 and 50 years; the age of degenerative and man-made diseases with continuous decline in mortality stabilizing at a comparatively low level and LEB now is above 50 years. The fertility occurs to be the determining factor of population growth during the last stage of the epidemiologic transition.

Nearly three decades later, Omran (1998) revisited its original presentation of the theory. Based on the observed changes in health, survival, mortality and fertility since the first theory formulation, the author proposed moving from three stages to five stages model with overlaps in between: the first stage of pestilence and famine; the second stage of receding pandemics; the third stage of degenerative, stress and man-made diseases which first took place in Northern and Western Europe in the second half of the 19th century; the fourth stage of declining cardiovascular mortality and population ageing when LEB reaches 80–85 years or longer, especially among females; and the fifth stage of aspired quality of life and paradoxical life expectancy which is a "futuristic" stage. The above five-stage model, though was proposed for the Western societies. Non-Western societies, according to Omran (1998), experienced fundamentally different epidemiologic transition: the first stage of pestilence and famine; the second stage of receding pandemics; and the third stage of triple health burden. Being more challenging, the third stage of epidemiologic transition in non-Western societies started in the 1970s or later entailing: "the unfinished old set of health problems" including communicable diseases, malnutrition, maternal mortality, and so on; "a rising new set of health problems" including NCDs; "lagging or ill-

prepared health systems and medical training" (Omran 1998, p. 106-7). Countries of the former Soviet Union studied in this research happen to fall under "non-Western" category. The new proposed model of epidemiologic transition will serve as the guiding theoretical ground of morbidity and mortality analysis in the context of population ageing process in post-Soviet countries.

Chapter 4

Research aims, paths and expectations

4.1 Research goal and objectives

The goal of this doctoral thesis is to demonstrate that it is time to recognize the importance of population ageing and its dynamics even in countries with relatively young population structures and to take urgent action through implementation of corresponding policy interventions in order to mitigate and eliminate the upcoming negative consequences and utilize potential opportunities. The following research objectives are set to meet the goal of the study:

1. To identify, describe and analyse the demographic determinants of population ageing in twelve post-Soviet countries including the decline in fertility, the increase in life expectancy and the role of migration.
2. To determine and analyse the age and sex structure changes taking place during the ageing process in the countries of the former Soviet Union.
3. To estimate and compare the quantum and tempo of population ageing in post-Soviet countries.
4. To assess the consequences of the extent and dynamics of population ageing on selected health and social sectors and confront them to current ageing related policies in the studied countries.
5. To formulate research-based policy recommendations required to timely mitigate the negative consequences of ageing and utilise ensuing potential opportunities in the twelve countries of the former Soviet Union.

4.2 Research questions and hypotheses

Research question (RQI): How does the extent of age structure changes occurring during the ageing process driven by the demographic determinants in the twelve countries of the former Soviet Union differ in terms of geographical location?

Existing evidence suggests that European countries were the pioneering populations in terms of fertility decline. The demographic revolution first started in Europe at the end of the 18th

century where mortality decline followed by a decline in fertility led to age structure changes. European countries have continuously topped the lists of lowest fertility countries until the beginning of the 2000s when the situation changed and half of the top ten lowest fertility countries are now located in Asia (United Nations 2015a). Besides, it is widely recognized that population ageing is the phenomenon that originated in Europe as a result of unprecedented age structure changes, an aftermath of demographic revolution. Therefore, it is expected that fertility decline and geographical location are also correlated when it comes to post-Soviet states.

Hypothesis I is formulated as follows:

There is a correlation of fertility decline, the extent of age and sex structure changes and geographical location in European or Asian regions of the post-Soviet space.

Research question (RQII): How do Asian and European countries of the former Soviet Union compare in terms of quantum and tempo of population ageing?

Countries of Western and Northern Europe experienced the longest and earliest demographic transition processes while less developed countries including those of Asia started the transition process only in recent decades and it tends to be significantly less gradual. Being the direct outcome of the demographic revolution, population ageing brings along momentous age-structural changes with increasing proportion of older population. The proportion of older population, for instance, increased from 7% to 14% in less than 30 years in East and Southeast Asia while in more developed countries of Europe and North America the course of ageing was gradual lasting between 70 and 115 years (Kinsella and Phillips 2005). Consequently, it is envisaged that the observed correlation also pertains to countries of the former Soviet Union.

Hypothesis II is formulated as follows:

The timing and extent of age-structural shifts are closely related and are more pronounced in Asian countries of the post-Soviet space which are experiencing higher quantum and tempo of ageing compared to European countries.

Research question (RQIII): How does the pace of demographic changes affect health and social sectors in the studied countries?

Unprecedented demographic changes are transforming the societies and the world in a fundamental way. Being the direct outcome of the demographic revolution, population ageing does not take place independently from economic, health and social changes. Evidence shows that less developed countries are experiencing significantly shorter demographic transition processes and growing older more rapidly as a result (Kinsella 2000). It is expected that there exists a correlation between the pace of demographic changes and the extent of the challenges in health and social sectors in the post-Soviet countries.

Hypothesis III is formulated as follows:

The pace of demographic changes and the extent of population ageing related challenges in health and social sectors are closely related in the countries of the former Soviet Union.

Research question (RQIV): How do post-Soviet countries compare in terms of population ageing awareness and does it go beyond concerns translating into practical action in the form of public policy response in the twelve studied countries?

Despite scientific evidence, population ageing and its implications are yet to receive global recognition. Abundant research results do not always lead to policy action on ageing. It is no longer a simple need to raise awareness about population ageing and its consequences but an acute urgency to start a dialogue between national scientific research and policymaking institutions. Thus, it is predicted that in post-Soviet countries, ageing awareness and practical action in the form of public policies are not positively correlated.

Hypothesis IV is formulated as follows:

Recognition of population ageing as a major concern does not necessarily lead to practical action translated into public policies in the studied countries of the former Soviet Union.

Research question (RQV): What impact have quantum and tempo of population ageing had on the extent of ageing related public policy action in the countries of the former Soviet Union?

As mentioned above, existing evidence shows that more developed countries have undergone gradual demographic transition processes while less developed countries experience significantly faster processes of demographic change resulting in short demographic transitions. As a result, less developed countries are ageing with higher quantum and tempo. Rapid age-structural changes, however, are not translated into policy action in most of the less developed countries (United Nations 2015b). It is envisaged that the quantum and tempo of population ageing in the studied countries of the former Soviet Union is correlated with the extent of related policy action.

Hypothesis V is formulated as follows:

There is a relationship between quantum and tempo of population ageing and the extent of policy action in the countries of the former Soviet Union.

Chapter 5

Data availability and quality

5.1 Data sources

The core component of any empirical study is data availability and quality. This research was conducted mainly based on the data of the UN 2019 Revision of the World Population Prospects (WPP). The period of investigation is 1950–2020 extended by projected trends until 2100. The data is estimated by five-year intervals. The WPP 2019 estimates of demographic components are based on censuses, registries of vital events, demographic surveys, etc.

Individual country projections are produced using the cohort-component projection method. As noted in the WPP 2019 report, the used method is technically not a complete projection method but more an application of matrix algebra enabling the calculation of the effect of expected future patterns of mortality, fertility and migration on a given population. The base year of the projections is 2020. Medium fertility variant is used throughout this research.

The following data sources are used to compute WPP 2019 estimates of population and components of demographic change in post-Soviet countries:

- Armenia: total population, age and sex structure data was based on censuses including the most recent 2011 census adjusted to reflect de-facto population; fertility data was retrieved from registered births and Demographic and Health Surveys (DHS); mortality data from official mortality estimates and DHS was adjusted for underregistration and underreporting of infant and child deaths; international migration estimates were based on the differences between population growth and natural increase.
- Azerbaijan: total population and distribution by sex and age data was estimated based on the censuses including the most recent one from 2009 as well as official estimates; fertility data was derived from official estimates of age-specific fertility rates, registered births adjusted for underregistration, Reproductive Health Surveys (RHS) and DHS; mortality data adjusted for older ages was obtained from official estimates; international migration estimates were also based on the differences between population growth and natural increase.

- Belarus: total population, age and sex structure data was based on the censuses including the most recent one from 2009 and official estimates; fertility statistics was derived from official estimates and registered births; mortality data was based on official estimates as well as registered deaths; international migration was calculated based on the differences between overall population growth and natural increase.
- Georgia: age and sex structure and total population data was estimated based on the census data including the most recent one from 2014 adjusted for underenumeration (to include the areas that were excluded from 2014 census enumeration), official estimates adjusted to reflect de-facto population; fertility data was based on official estimates, registered births and RHS; mortality estimates were derived from official estimates and registered deaths adjusted for underregistration; international migration estimates were based on the differences between population growth and natural increase.
- Kazakhstan: total population data and distribution by sex and age was calculated based on the censuses including the most recent one from 2009 as well as official estimates; fertility data was derived from official estimates, registered births, DHS and Multiple Indicator Cluster Survey (MICS); mortality data was based on official estimates and registered deaths; international migration was calculated as the difference between population growth and natural increase.
- Kyrgyzstan: total population, sex and age structure data was obtained from censuses inclusive of the most recent one from 2009 and official estimates; fertility data was based on official estimates, registered births, DHS, Living Standards Measurement Study (LSMS) and MICS; mortality statistics adjusted for older ages was based on official estimates and registered deaths; international migration estimates were based on the differences between population growth and natural increase.
- Moldova: age and sex structure as well as total population data was obtained from the censuses including the latest 2004 census and official estimates; fertility statistics was based on official estimates, registered births, RHS, DHS and MICS; mortality data extrapolated using projection methods was based on official estimates and registered deaths; international migration was calculated as the difference between population growth and natural increase as well as official statistics of net international migration flows.
- Russia: total population data and distribution be sex and age was based on the censuses inclusive of the most recent 2010 census and official estimates; fertility data was obtained from official estimates and registered births; mortality statistics adjusted for older ages was based on official estimates; international migration was calculated as the difference between population growth and natural increase.
- Tajikistan: age and sex structure as well as total population data was obtained from the censuses including the latest 2010 one as well as official estimates; fertility statistics was based on registered births adjusted for underregistration, official estimates, DHS, LSMS, MICS; mortality data adjusted for older ages was derived from registered deaths;

international migration estimates were based on the differences between population growth and natural increase.

- Turkmenistan: total population data and distribution by age and sex was obtained from the censuses including the 1995 one as well as official estimates; fertility data was based on official estimates, DHS and MICS; mortality statistics was derived from official estimates and registered deaths adjusted for underregistration; international migration was calculated as the difference between population growth and natural increase and additionally based on official figures of net international migration flows as well as information on population born abroad derived from registers and censuses from major countries of destination.
- Ukraine: age and sex structure as well as total population data was based on the censuses inclusive of the most recent 2001 census as well as official estimates; fertility statistics was obtained from official estimates, registered births, RHS and DHS; mortality data adjusted for underregistration was based on official estimates and registered deaths; international migration estimates were based on the differences between population growth and natural increase.
- Uzbekistan: total population, age and sex structure data was based on censuses including the last 1989 census and official estimates; fertility data was derived from official estimates, registered births and DHS; mortality statistics adjusted for older ages and for underregistration was based on official estimates and registered deaths; international migration data was calculated as the difference between population growth and natural increase.

Selected health and social indicators analysed in this research were based on the data from European Observatory on Health Systems and Policies, Institute for Health Metrics and Evaluation (IHME), International Labour Organization (ILO), International Social Security Association (ISSA) and World Health Organization (WHO). Very limited data was gathered from national statistical offices of the studied countries given that detailed data is not available in open access. Below is the detailed description of data availability based on the health and social indicators analysed in this research:

- Healthy life expectancy (HALE) at age 60 data analysed in this study was obtained from the Global Health Observatory data repository of WHO. The data is based mainly on vital registration statistics and for countries with incomplete vital registration, surveys serve as the main data source.
- Burden of disease analysed through disability-adjusted life years (DALYs) as a sum of years lived with disability (YLDs) and years of life lost due to premature mortality (YLLs) as well ask risk factors were obtained from IHME. The data was derived mainly from national statistical offices of the twelve countries of the former Soviet Union, DHS, MICS, Comprehensive Food Security and Nutrition Survey (CFSNS) and WHO mortality database.

- Health care spending was analysed through national health spending by source of funding as well as per capita health care expenditures based on the data from IHME Financing Global Health report and Global Health Expenditure Database of WHO.
- The data on palliative and long-term care was gathered from Health Systems in Transition country reports prepared by the European Observatory on Health Systems and Policies in collaboration with WHO.
- LFPR and median age of labour force in the studied countries was analysed using the data from ILO. The data is based on censuses, labour force surveys, insurance records, establishment surveys and official government estimates.
- Data on current and past statutory retirement ages was obtained from official statistics of Ministry of Labour and Social Protection of Azerbaijan and Belarus, Pension Fund of Russia and latest ISSA reports.

5.2 Data quality

There is no perfect demographic data (especially in LDCs), which results in some degree of uncertainty in population as well as related mortality, fertility and migration estimates, notably so for earlier decades.

The principal data source for WPP 2019 estimates is the population census but Uzbekistan, for instance, has not held one since 1989. For LDCs where data is limited, lacking or unreliable, the WPP 2019 estimates are obtained through model-based methods of indirect computations.

WPP 2019 projections for life expectancy at birth (LEB) provide only one scenario – medium fertility variant. This variant reflects only variation in future fertility trends which does not allow to carry out more accurate analysis of projected trends in LEB. In this regard, Khan and Lutz (2007), having analysed the accuracy of UN population projections since the 1950s for six Asian countries, have concluded that the change errors did not decline with time suggesting that it is essential to consider alternative scenarios even if it may seem unrealistic at the time when projections are made.

State statistical agencies of the twelve countries of the former Soviet Union studied here do not always provide detailed demographic, health and social statistics. Among others, the following countries provide very limited demographic statistics in open access: Statistical Committee of the Republic of Armenia provides only TFR and LEB (Statisticheskiy Komitet Respubliki Armeniya 2020); demographic indicators provided by the State Statistical Agency of Tajikistan do not include age-structural components (Agenstvo po Statistike pri Prezidente Respubliki Tadzhikistan 2020); State Statistical Committee of Turkmenistan does not provide demographic statistics in open access (Gosudarstvennyy Komitet Turkmenistana po Statistike 2020). These data limitations did not allow carrying out cross-comparison of analysed indicators between WPP 2019 estimates and officially reported statistics of post-Soviet states studied in this research.

Chapter 6

Methodology

6.1 Research design

This empirical study is a quantitative research which made use of confirmatory approach to test the hypotheses. To determine causal factors and outcomes of population ageing phenomenon in the twelve post-Soviet countries, we measured the quantum and tempo of ageing and tested its relationship with selected health and social indicators while research-based policy recommendations were developed as a result of performed gap analysis. This quantitative research design was based on the method of deductive reasoning with employment of the procedure succinctly formulated as follows:

- The hypotheses were formulated based on the research questions elaborated as a result of extensive background research of relevant scientific literature and identifying the lack of understanding the quantum and tempo of population ageing phenomenon, associated potential challenges and importantly the absence of clear assessment of the ageing scenario and policy action in the twelve countries of the former Soviet Union;
- To meet the objectives of the research, secondary data was collected from the UN WPP 2019 estimates and projections to represent the core demographic data since not all of the state statistical offices of the studied countries provide the required data in open access; complimentary data gathered to analyse selected health and social sectors was described in detail in Sub-chapter 5.1; the hypotheses were tested once the data was analysed using the methods described further in detail.

6.2 Data analysis

Data analysis techniques described in this sub-chapter were used to answer the research questions and test the derived hypotheses. Data screening was performed before commencing the analysis where the collected data sets were checked for missing values and outliers in SPSS. Given the nature of collected data, no outliers were detected during data screening. Missing values detected in the data set prepared for multivariate clustering analysis were replaced with the series mean.

The first section of demographic data analysis incorporated the following indicators for the twelve countries of the former Soviet Union (listed in order of appearance in the analysis):

Total Fertility Rate (TFR) defined as the average number of live births a hypothetical cohort of women would have at the end of their reproductive period if they were subject during their whole lives to the fertility rates of a given period and if they were not subject to mortality is calculated as follows:

$$TFR = \sum (\frac{B_x}{P_x^f})$$

where: B_x = number of live births to women aged *x* during a calendar year;

P_x^f = mid-year number of women at age *x*.

TFR was analysed separately for the countries with the observed above replacement levels and below replacement levels in 2020.

Life expectancy at birth (LEB) is calculated through a life table from age-sex specific mortality rates and population by age and sex. In this study, LEB was analysed separately for males and females considering substantial sex structure differences of the studied post-Soviet populations.

Healthy life expectancy (HALE) is measured using Sullivan's method from the country life tables applying age and sex specific estimates of severity-adjusted equivalent number of years of healthy life lost as a share of overall years lived by each age and sex group. WHO (2020b) data on healthy life expectancy at age 60 (HALE60) is calculated using the following technique:

$$HALEx = \left(\sum_{i=x}^{w} YWD_i\right)/l_x$$

where: D_x = equivalent lost healthy year fraction between ages x and $x+5$;

L_x = total years lived by the life table population between ages x and $x+5$;

l_x = number of survivors at age x.

$YD_x = L_x * D_x$ = equivalent lost years of healthy life between ages x and $x+5$;

$YWD_x = L_x\ (1 - D_x)$ = equivalent years of healthy life lived between ages x and $x+5$.

Median age divides the population in two parts of equal size, that is, there are as many persons with ages above the median as there are with ages below the median. The median age from grouped data is a useful measure of age structure as, compared to the mean, it is unaffected by extreme values and can be calculated for age groups with open intervals.

Old-age dependency ratio (OADR) is measured as the number of individuals aged 65 and over per 100 individuals aged 15-64 years:

$$Old-age\ dependency\ ratio = \frac{P_{65+}}{P_{15-64}} * 100$$

Quantum and tempo of population ageing was analysed separately for two important thresholds, i.e., when the proportion of older population aged 65 and over increases from 7% to

14% and from 14% to 21%. Populations do not undergo the demographic revolution with a uniform quantum and tempo. Hence, it is important to distinguish those two phases to understand the current and expected dynamics of ageing in a given population. This study proposes to measure quantum and tempo of ageing as a ratio of percentage point increase in the population aged 65 and over from 7% to 14% and from 14% to 21% to the number of years required to reach those two thresholds:

$$Q\ and\ T\ (threshold\ I) = \frac{0{,}007}{Y_2 - Y_1} * 1000$$

$$Q\ and\ T\ (threshold\ II) = \frac{0{,}007}{Y_3 - Y_2} * 1000$$

where: $0{,}007$ is the percentage point increase in the population aged 65 and over, i.e. 14%–7% = 7‰ and 21%–14% = 7‰ expressed as a decimal number;

Y_1 = the year when the proportion of older population aged 65 and over reaches 7% in a given population;

Y_2 = the year when the proportion of older population aged 65 and over reaches 14% in a given population;

Y_3 = the year when the proportion of older population aged 65 and over reaches 21% in a given population.

Multivariate clustering analysis carried out to reveal statistically justified homogenous groups of countries among the studied post-Soviet states based on seven demographic indicators is described in detail in the consequent Sub-chapter 6.3.

The second section encompassed data analysis of selected health and social indicators in the studied countries.

Disability-adjusted life years (DALYs) measure overall burden of disease and are calculated as the sum of years lived with disability (YLDs) and years of life lost due to premature mortality (YLLs). One DALY stands for the loss of the equivalent of one year of full health. YLDs for a particular cause and specific time period are calculated through the number of incident cases during that period multiplied by the average duration of the disease and a weight factor of the disease severity using the scale of 0 as perfect health to 1 as death. YLLs for a specific cause are estimated through the number of cause-specific deaths multiplied by a loss function defining the years lost for deaths as a function of the age at which death happens (WHO 2013).

National health spending by source of funding data analysed in this study is defined as government, out-of-pocket and prepaid private health spending including international development assistance for health (IHME 2017). It was calculated in purchasing power parity dollars (PPP$).

Existence of correlation of total per capita health care expenditures (HCE) (PPP$) with HALE60, universal health coverage (UHC) index of service coverage and the number of physicians and nurses was tested through quadrant charts.

UHC service coverage index is defined as the coverage of essential services based on tracer interventions including maternal, reproductive, new-born and child health, infectious diseases,

NCDs as well as service access and capacity among the population. The indicator is calculated as the geometric mean of 14 tracer indicators reported on a scale of 0 to 100 (WHO 2019).

Potential support ratio is measured as the number of individuals aged 15–64 years per every individual aged 65 and over:

$$Potential\ support\ ratio = \frac{P_{15-64}}{P_{65+}}$$

Labour force participation rate (LFPR) measures the proportion of working-age population actively participating in the labour market (working or looking for work). It is expressed as the size of labour force available to partake in the production of goods and services relative to the size of working-age population. Labour force is the total number of both employed and unemployed individuals (ILO 2020). In this research, LBRP rates were analysed by broad age groups of 15–24 years, 25–54 years, 55–64 years and 65+ for females and males separately. Method of computation is the following:

$$LFPR = \frac{Persons\ employed + Persons\ unemployed}{Working\ age\ population} * 100$$

Gap analysis presented in the final section of data analysis served as the background of this research which helped to identify the sequence of steps required to meet the goal of the study. Gap analysis approach was first developed as a methodological framework for service quality management by Parasuraman, Zeithaml and Berry (1985). Today, gap analysis approach is applied in various disciplines, even though, it is rarely used in social sciences. Given the nature of this empirical study, we believe that this approach provides relevant framework to meet the objective of bridging the divide between scientific research and public policy action. The world of science is very often detached from practical policy action. There is a lack of constructive dialogue between scientists and policy makers. Combating the negative consequences of population ageing phenomenon and utilizing the opportunities it offers requires the interaction of scientists and policy makers. The efficiency of policy action and public awareness can only be achieved when the decisions are informed by adequately analysed data from all relevant sectors through holistic approach. Gap analysis was performed in three steps:

- Step 1 – Current state: current and projected demographic trends in the twelve countries of the former Soviet Union were identified and analysed;
- Step 2 – Gap: selected health and social sectors were analysed to identify challenges of population ageing in the post-Soviet countries; policy action with regards to population ageing phenomenon in the studied countries was scrutinized;
- Step 3 – Action plan: key factors for change in the form of research-based policy recommendations were proposed to close the identified gaps.

All the figures and tables presented in this study were created by the author in Datawrapper and SPSS.

6.3 Statistical treatment

The goal of the hierarchical cluster analysis in this study was to classify the twelve countries of the former Soviet Union based on seven indicators determining the changes of demographic structures in those countries in order to reveal statistically justified homogenous groups. Cluster analysis is a multivariate method of sorting data objects into clusters based on similarity. In accordance with its utility in finding useful groupings, clustering has become one of the leading methods of multivariate analysis (Kettenring 2006).

The seven indicators included:

1) Total fertility rate (TFR);
2) Life expectancy at birth (LEB);
3) Healthy life expectancy at age 60 years (HALE60);
4) Old-age dependency ratio (OADR);
5) Median age;
6) Quantum and tempo of population ageing during the first phase of 7% to 14% increase;
7) Quantum and tempo of ageing during the second phase of 14% to 21% increase.

Hierarchical cluster analysis is the most widely used type of clustering among the researchers which is preferred over non-hierarchical clustering as the former one requires the researcher to assume the final number of clusters in advance which is not convenient when there is uncertainty about the number of clusters at the initial stage and consequently the analysis has to be re-run for each possible outcome (Ferreira and Hitchcock 2009; Romesburg 2004; Yim and Ramdeen 2015). Agglomerative clustering, i.e., "bottom up" approach was chosen for this study. It is the most commonly used technique as opposed to divisive hierarchical clustering which requires heavy computational load (Manning, Raghavan and Schütze 2008; Yim and Ramdeen 2015). The algorithm here starts with each object as a singleton cluster followed by combining two most similar clusters until the entire set of data is combined in one group. The results are plotted in a dendrogram.

Within hierarchical agglomerative clustering there are a number of various methods determining which clusters should be grouped at each consecutive stage of the analysis. Since the variables chosen for the cluster analysis in this study are quantitative and not binary, the data does not contain outliers and clusters of similar sizes are expected as a result, the choice fell on the recommended Ward's method. Dendrogram outputs based on Ward's method are also known to be empirically more interpretable compared to other linkage methods (Miyamoto et al. 2015). This method computes the total within-cluster sum of squares to determine which next two groups should be merged at each step (Ferreira and Hitchcock 2009). For multivariate data the error sum of squares (SSE) is defined as follows:

$$SSE = \sum_{i=1}^{K} \sum_{j=1}^{n_i} (y_{ij} - \bar{y}_i)^2$$

where y_{ij} is the j^{th} object in the i^{th} cluster;

n_i is the number of objects in the i^{th} cluster.

The most common distance measure for interval data in Ward's method is Euclidean distance. Euclidean distance between two points $X(x_1, x_2, \ldots x_n)$ and $Y(y_1, y_2, \ldots y_n)$ is given by:

$$d = \sqrt{\sum_{i=1}^{n} (x_i - y_i)^2}$$

All variables were standardized using Z scores before clustering:

$$Z_i = \frac{x_i - \bar{x}}{\sigma}.$$

where xi is the value of the variable;

$\bar{x}$ is the mean value;

σ is standard deviation.

The analysis was performed with SPSS software.

Chapter 7

Transforming demographic structures

An omnipresent demographic regularity observed in all corners of the world is demographic revolution (Kirk 1996). Being the direct outcome of the demographic revolution, the process of population ageing is likewise expected to sooner or later affect all of the countries worldwide. MDCs have been growing older for over a century now while for LDCs it is a new phenomenon. As a result of substantial improvements in mortality and declines in fertility which result in age structure changes, populations are growing older and the process is accelerating (United Nations 2019a). Older population is growing both in absolute and relative terms. The number of older persons is estimated to pass a threshold of 1.5 billion by 2050 of which 1.2 billion will come from LDCs (United Nations 2019b). A group of Post-Soviet countries with diverse socio-economic profiles but common recent history comprises a poorly studied region in the field of demography.

It is the interplay of the main demographic forces such as fertility and life expectancy what determines the course of ageing process and age-sex structural shifts in a population. This chapter incorporates the first step of gap analysis. The first part of this chapter presents the analysis of the development of demographic determinants of population ageing and age-sex structure changes taking place in the studied countries since 1950. The existence of a relationship between fertility decline, the extent of age-sex structure changes and geographical location among the studied countries is investigated. The second part is dedicated to measuring the quantum and tempo of population ageing in the countries of the former Soviet Union. The correlation of the timing and extent of age-structural shifts and the quantum and tempo of ageing in the studied countries is tested through hierarchical agglomerative clustering.

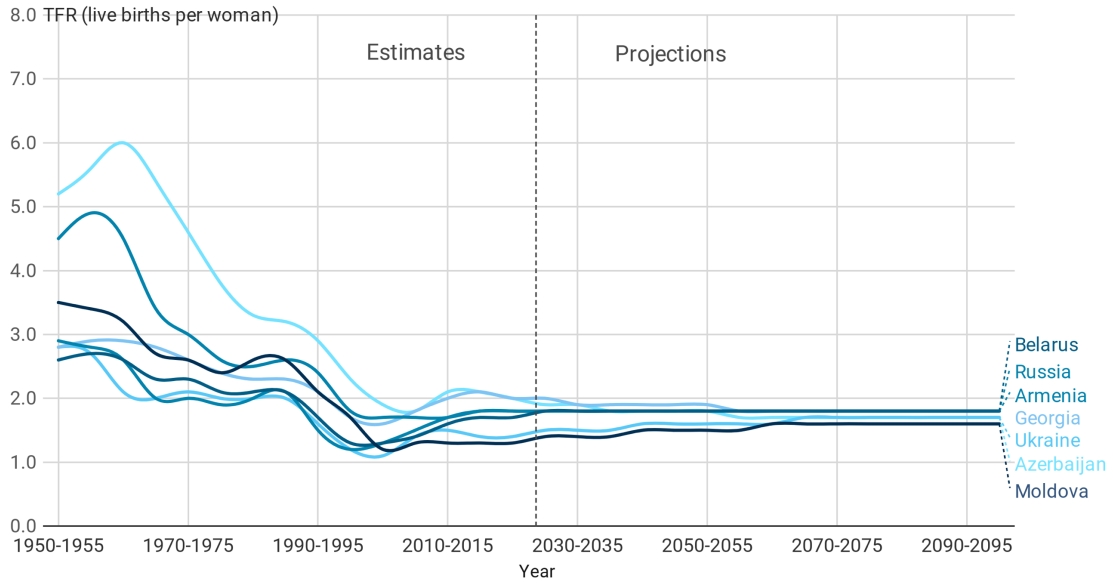
7.1 Demographic determinants of population ageing

7.1.1 Decline in fertility

The process of population ageing becomes largely pre-programmed when birth rates continue to decrease over the decades resulting in shrinking numbers of potential mothers in the future (Lutz and Skirbekk 2004).

Having shared the common past, neighbouring post-Soviet countries experience varied demographic trends. Countries can be divided into two groups based on the observed levels of TFR (Fig. 1 and Fig. 2). According to United Nations (2019b) estimates, TFR has fallen below replacement levels in seven countries: Russia and Ukraine were the first countries where fertility dropped below the threshold of 2.1 live births per woman during 1965–1970; in Belarus it happened after a decade during 1975–1980; in Georgia during 1990–1995; in Armenia and Moldova during 1995–2000; in Azerbaijan during 2000–2005. In the beginning of the observed period (1950s), the lowest TFR of 2.6 live births per woman was observed in Belarus and the highest one of 5.2 live births per woman in Azerbaijan. As seen from Figure 1, the sharpest decline during the period 1950–2020 has been observed in Armenia and Azerbaijan where fertility dropped from 4.5 and 5.2 live births to 1.8 and 2.1 live births respectively. Figure 1 illustrates that seven countries of the former Soviet Union, though with varied rates, follow similar pattern of fertility development throughout the observed period.

Fig. 1 – Total fertility rate (TFR) in post-Soviet countries with below replacement levels, 1950–2100



Source: United Nations (2019b).

Apart from Armenia and Moldova, all five countries presented in Figure 1, have experienced a relapse in their TFR during the observed period. Let us have a closer look at each country and the underlying factors:

1) In Azerbaijan, a sharp decline was observed during the period 1990–2005 when TFR dropped from 2.9 reaching a nadir of 1.8 live births. Starting from 2005 it has recovered back to the replacement level of 2.1 live births. The observed trend in fertility during that period was dominantly influenced by the conflict in Nagorno-Karabakh as well as other political-ethnic changes which led to a decline in living standards and postponement of births (Rowland 2004; Verdiyeva 2019).
2) After decades of continued decline, TFR in Belarus has been showing a steady recovery having increased from 1.3 to current 1.7 live births per woman since the mid-2000s (United Nations 2019b). The observed dynamics is characterized by the two main factors

(Privalova and Stanishevskaya 2014). Firstly, it has been a result of favourable shifts in the age and sex structure of the population which manifested not only through the increase in the share of females of reproductive age but also through the increase in the proportion of females aged 20–29 years (in the total number of females) to 14.4% in 2012. Besides, the increased number of births during the 2000s was an aftereffect of postponed births in the 1990s. Second factor, according to Privalova and Stanishevskaya, was a series of measures implemented under the National Demographic Security Program for the period 2011–2015 aimed at strengthening the support for families with children. Though, the effect on cohort fertility is questionable as it cannot be measured four years after the start of the program.

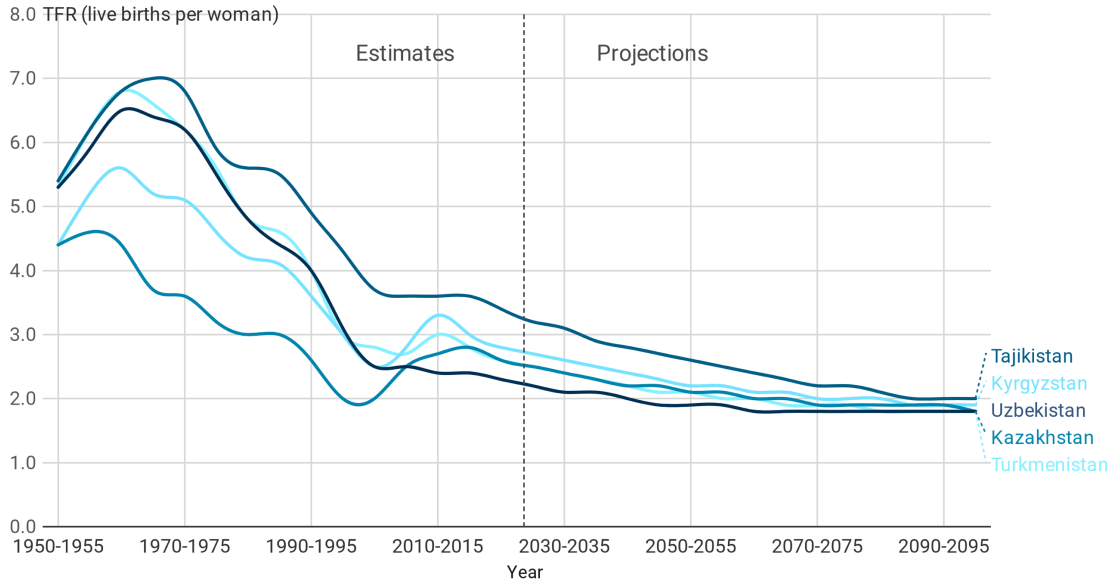
3) Georgia experienced a plunge in fertility during the period 1990–2005 (United Nations 2019b). Study results of Balbo (2009) indicate that fertility decline was mostly determined by a substantial reduction or postponement of higher-order births. Having analysed the census of 2002, Rowland (2006), in its turn, concluded that ethnic Georgian population had relatively low fertility and their sharp increase by ten percentage points (during 1989–2002 as a result of immigration of ethnic Georgians along with possible ethnic re-identification) in the share of the total population actually resulted in the decline of overall national fertility.
4) In Russia, social policy measures (family-with-children support program) implemented during the 1980s resulted in increased fertility to just above the replacement level in nearly all reproductive ages around the country according to Zakharov and Ivanova (1996). State incentives led to the growth in the average number of births, even in cohorts that had completed their reproductive activity, and the reduction in intervals between births. The five-year long trend of the first and second births occurring ahead of schedule resulted in the compensatory effect of sharp decline in fertility in the 1990s. Zakharov and Ivanova (1996) assert, contrary to common opinion, that there exists no sufficient evidence to relate the political and economic crisis of the 1990s to the decline in Russian fertility. A new comprehensive policy to support childbearing has been adopted since the mid-2000s in Russia which, in line with potential impact of births postponement recuperation, resulted in steady increase of period fertility until 2020 (Gietel-Basten et al. 2020). TFR has increased from 1.3 to 1.8 live births per during this period.
5) TFR plummeted from 1.6 births in the first half of the 1990s to as low as 1.1 live births per woman in the beginning of the 2000s in Ukraine (United Nations 2019b). It is the only country in the studied post-Soviet space where fertility dropped to one of the lowest levels observed in the world today. The most probable aspects that have influenced the decline to very low fertility in Ukraine include economic uncertainty after the collapse of the Soviet Union and weakening importance of marriage as an institution (decline in marriages and out-of-wedlock childbearing) (Perelli-Harris 2008; Romaniuk and Gladun 2015). Those factors resulted in the postponement of higher-order births which explains the relapse of TFR to 1.4 during 2005–2010 when second- and third-order births

substantially increased presumably as a result of state incentives in the form of increased birth allowances (Romaniuk and Gladun 2015).

McDonald (2002) distinguishes two groups of countries with low fertility, those with TFR above 1.5 births and the ones where it fell below this critical level. Among post-Soviet countries, Moldova and Ukraine had the lowest registered fertility rate of 1.3 and 1.4 live births per woman respectively during 2015–2020 (United Nations 2019b). According to McDonald (2002), it is more challenging for a country to raise fertility if it has fallen to the levels of 1.4 and below rather than to keep it at the level of 1.6 births per woman.

As observed in Figure 2, Central Asian countries have also been following a similar pattern of fertility development since the 1950s with variations in rates. During the early decades of the Soviet Union regime, it could have been expected that fertility pursued a classical downward trend that results from the industrialization. Albeit, the opposite took place and fertility was increasing until the 1970s. That marked the increase preceding the fertility transition experienced by many societies which, in countries of Central Asia, was predominantly caused by amelioration in health and nutrition, reduced length of breastfeeding period and decline in sterility along with improvements in fecundity (Barbieri et al. 1996; Spoorenberg 2017).

Fig. 2 – Total fertility rate (TFR) in post-Soviet countries with above replacement levels, 1950–2100



Source: United Nations (2019b).

In the 1990s, in light of economic collapse triggered by the dissolution of the Soviet Union, the number of first births remained stable whereas sharp decline in fertility was triggered by the postponement of higher-order births (Agadjanian, Dommaraju and Nedoluzhko 2013; Zimovina 2009). Kazakhstan, Kyrgyzstan and Turkmenistan have also experienced a relapse in their fertility during the 2000s (Fig. 2). Based on the analysis of Spoorenberg (2015), transformation in ethnic composition in the event of emigration of significant portions of European (ethnic Russians) origin population was the main cause behind fertility increase. During 2015–2020, the lowest TFR was observed in Uzbekistan – 2.4 births and the highest in Tajikistan – 3.6 births while

during 1950–1955 the fertility in those two countries was nearly identical with 5.3 and 5.4 live births per woman accordingly (Fig. 2).

Based on the United Nations (2019b) estimates, towards mid-century the highest TFR among post-Soviet countries should be observed in Tajikistan at the rate of 2.6 live births per woman followed by Kyrgyzstan with 2.2 births. In Turkmenistan and Kazakhstan fertility is expected to fall to replacement level of 2.1 live births per woman. The lowest levels in Central Asia would be observed in Uzbekistan – 1.9 births. Moldova and Ukraine are estimated to experience a slight increase from current 1.3 and 1.4 to 1.5 and 1.6 births accordingly. TFR in the remaining countries is expected to range between 1.8 and 1.9 live births per woman. It should be emphasized, though, that there is no consensus among demographers on the future of fertility. Some predict the stabilization of TFR at replacement levels in the long run. Others argue that in the countries where the TFR has plunged considerably lower than the replacement level the recovery is highly unpredictable.

Fertility decline was regarded to be the main factor behind the phenomenon of population ageing before the 1980s which changed towards the end of the 20th century when considerable improvements in old-age mortality became the essential contributing power of accelerated process of ageing (Gavrilov and Heuveline 2003).

7.1.2 Increase in life expectancy

"For most of human history, reaching old age was an exception." (Crampton 2009, p. 3). Today, in 39 countries of the world, LEB exceeds 80 years (United Nations 2019b). Whereas until mid-18th century LEB ranged from 25 to 35 years as estimated by the scientists (Notestein 1953; Vallin 2002). Divergence of longevity trend between MDCs and LDCs has been reducing over the last decades as a result of rapid progress in LDCs where LEB is expected to double by the end of this century reaching 81 years from 42 observed in 1950 (United Nations 2019b).

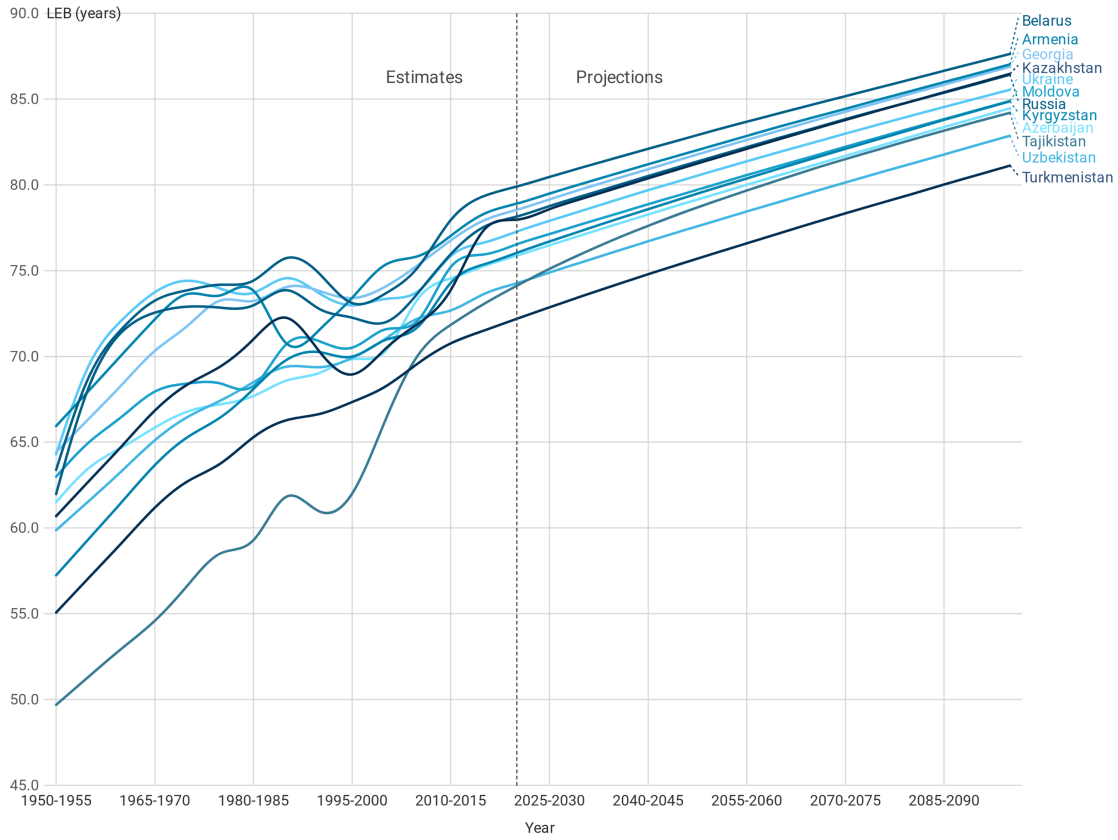
Oeppen and Vaupel (2002) emphasize that before 1950 most of the increase in LEB was due to significant reductions in death rates at younger ages while after that period, achievements in survival at older ages (65+) have become the main factor of increasing longevity. Demographic situation in the countries of the former Soviet Union, albeit, is exceptionally different compared to the rest of the world. The decade following the dissolution of the Soviet Union was marked by adverse mortality trends in the studied countries (Botev 2012; United Nations 2019b). This was perhaps the first time in the recorded population history when significant mortality surge was not a result of war or major epidemic (Avdeev 2001; Botev 2012).

As illustrated in Figures 3 and 4, LEB has been steadily increasing both for females and males in all twelve countries since the mid-20th century until the 1990s when all of the countries experienced its contraction or stagnation. This trend persisted through the decade and since the beginning of the 2000s LEB has recovered and been increasing.

Today, the highest female longevity among the studied countries is observed in Belarus – 79.3 years and the lowest in Turkmenistan – 71.5 years (Fig. 3). Average LEB among females in the countries of the former Soviet Union is 76.0 years. The biggest gain in longevity during the period 1950–2020 has been experienced by Tajik females – 23.4 years and the smallest by

Ukrainian females – 12.3 years. By 2050, the females in the studied countries are estimated to gain between 3.3 and 3.9 years, whilst the highest increase is once again expected for Tajik females – 5.3 years. Current world record of female longevity belongs to females of Hong Kong and Japan – 87.5 years (United Nations 2019b) which, among the studied countries, is expected to be reached by only Belarussian females towards the end of this century.

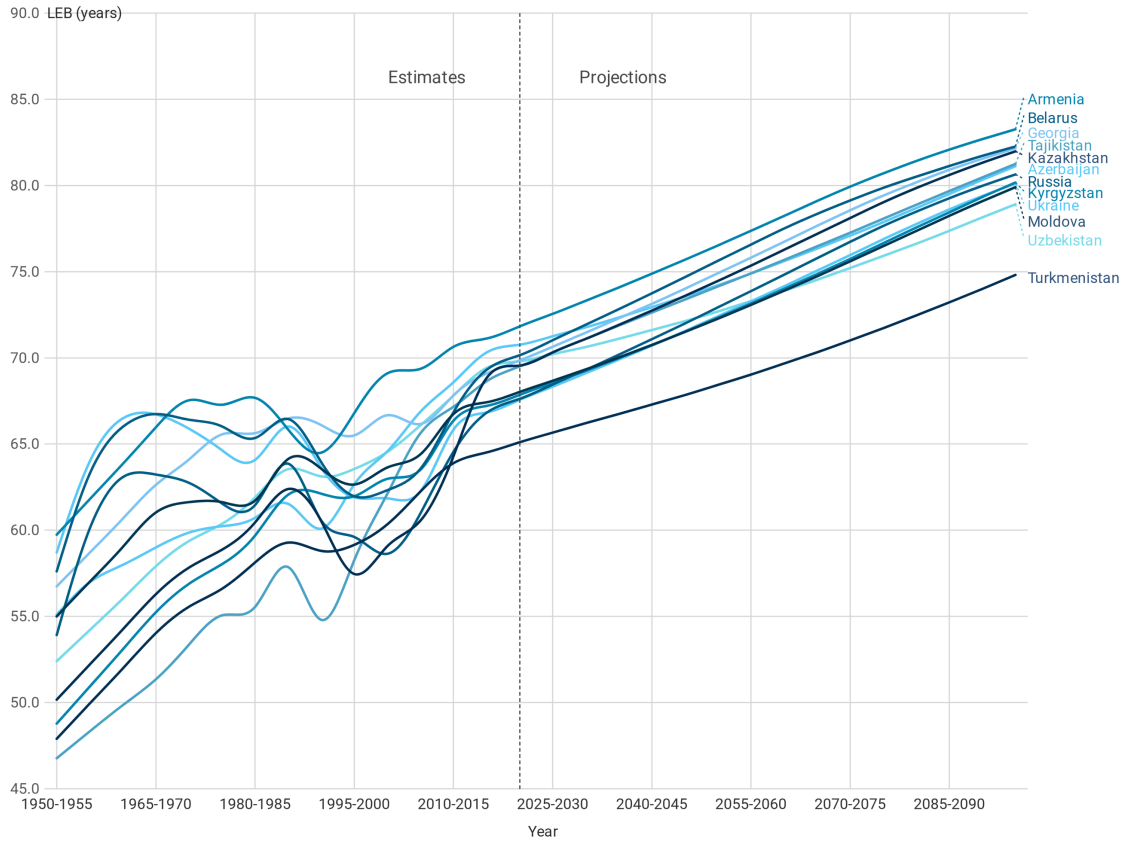
Fig. 3 – Life expectancy at birth (LEB) in post-Soviet countries, females, 1950–2100



Source: United Nations (2019b).

Figure 4 shows that among 12 countries Armenian males lived the longest in 2020 and Turkmen males the shortest – 71.1 and 64.5 years accordingly. Average LEB among males in the studied countries is 68.3 years. Since the mid-20th century the smallest gain in lifespan of 8.1 years has been witnessed by Ukrainian males whilst that was nearly threefold higher for Tajik males – they lived nearly 22 years longer in 2020 compared to 1950. During the coming three decades, males in Uzbekistan are estimated to add only 2.7 years to their life expectancy while Belarussian males double as much – 5.4 years. World average gender difference in LEB is 5 years (United Nations 2019b). This average is applicable only in three post-Soviet countries including Uzbekistan, Tajikistan and Azerbaijan. In Russia, Belarus and Ukraine, the difference between female and male longevity is excessively high measured at 10.7, 10.0 and 9.8 years respectively which is, if quoting Botev (2012, p. 71), "exacerbated beyond anything recorded so far in peace-time world population history". LEB observed among females in the countries of the former Soviet Union in 2020 would not be reached by males even by 2050 with an exception of Tajikistan.

Fig. 4 – Life expectancy at birth (LEB) in post-Soviet countries, males, 1950–2100



Source: United Nations (2019b).

It should be noted that UN WPP 2019 projections provide only one medium scenario for LEB which do not seem to be realistic where the projections have linear tendency with constant difference between the twelve observed countries throughout the whole projected period until 2100 as seen from Figure 3 and Figure 4. Nevertheless, it is always difficult to project mortality over long term considering that advancements in health care and changes in lifestyle may vary significantly and anticipating medical breakthroughs is nearly impossible.

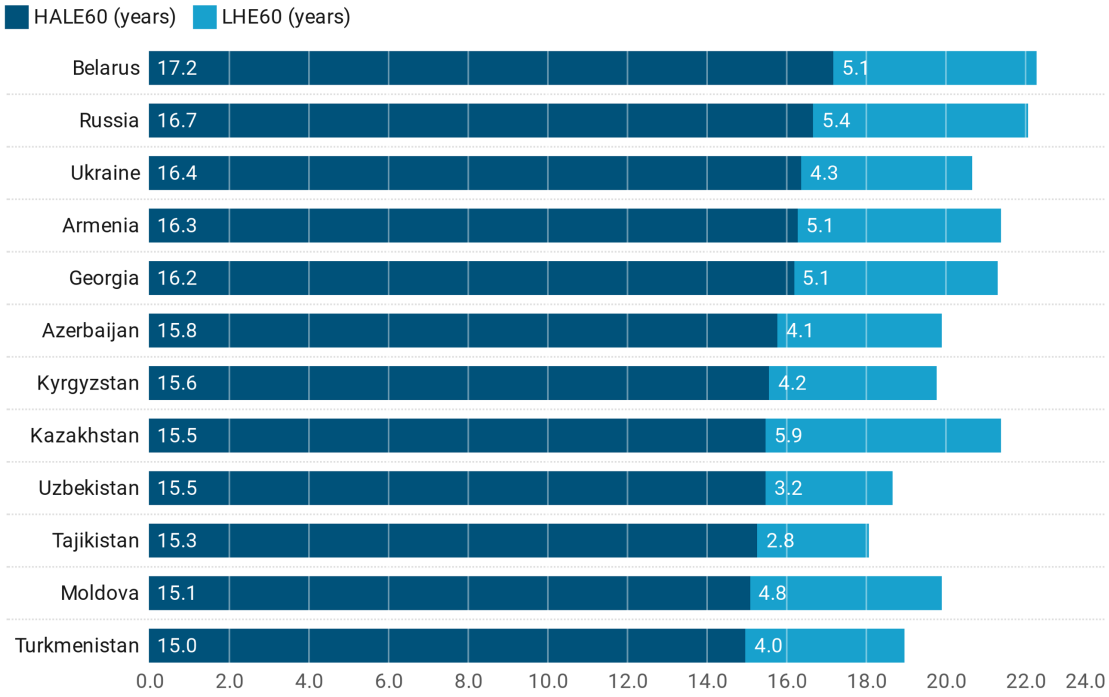
Ageing of the older population itself has become a remarkable feature of population ageing phenomenon as the proportion of oldest old (80+) is increasing more rapidly than the older population (65+) altogether (Kinsella 2000; United Nations 2019b). This can be viewed as a cause of celebration but are those added years lived in good health?

Much as mortality-based rates are useful in evaluating and comparing overall longevity of populations, when it comes to life expectancy at older age it is important to judge the health of older individuals. HALE at age 60 is an important measure of older population's health which considers combined impact of mortality and morbidity simultaneously referring to the remaining number of years that an older individual could expect to live in a healthy state (Belon, Lima and Barros 2014; Gold, Stevenson and Fryback 2002). WHO (2020b) estimated global HALE at age 60 for the year 2016 at 16.8 and 14.8 years for females and males accordingly. That was 5.5 and 4.3 years lower than life expectancy at age 60 for females and males respectively.

Figures 5 and 6 illustrate the number of years that older individuals aged 60 and over in post-Soviet countries live in a healthy state out of their total remaining life expectancy. We can observe

substantial differences in estimates for males and females as well as among the countries. Females aged 60 and over in Belarus enjoy the longest remaining life expectancy among the studied countries – 22.3 years out of which on average 17.2 are lived in good health (Fig. 5). Contrarily, in Tajikistan older females have the lowest LE60 estimated at 18.1 years, but 85% of these years are spent in good health which is the highest proportion among all twelve countries analysed in this study. In Kazakhstan, LE60 among females is one of the highest measured at 21.4 years, although only 72% of these years are enjoyed in good health which is the lowest proportion among the countries of the former Soviet Union. The difference of HALE60 and LE60 ranges between 2.8 and 5.9 years for females averaging at 4.5 years for the region as a whole.

Fig. 5 – Healthy life expectancy at age 60 (HALE60) and life expectancy at age 60 (LE60 = HALE60 + LHE60) in post-Soviet countries, females, latest available year



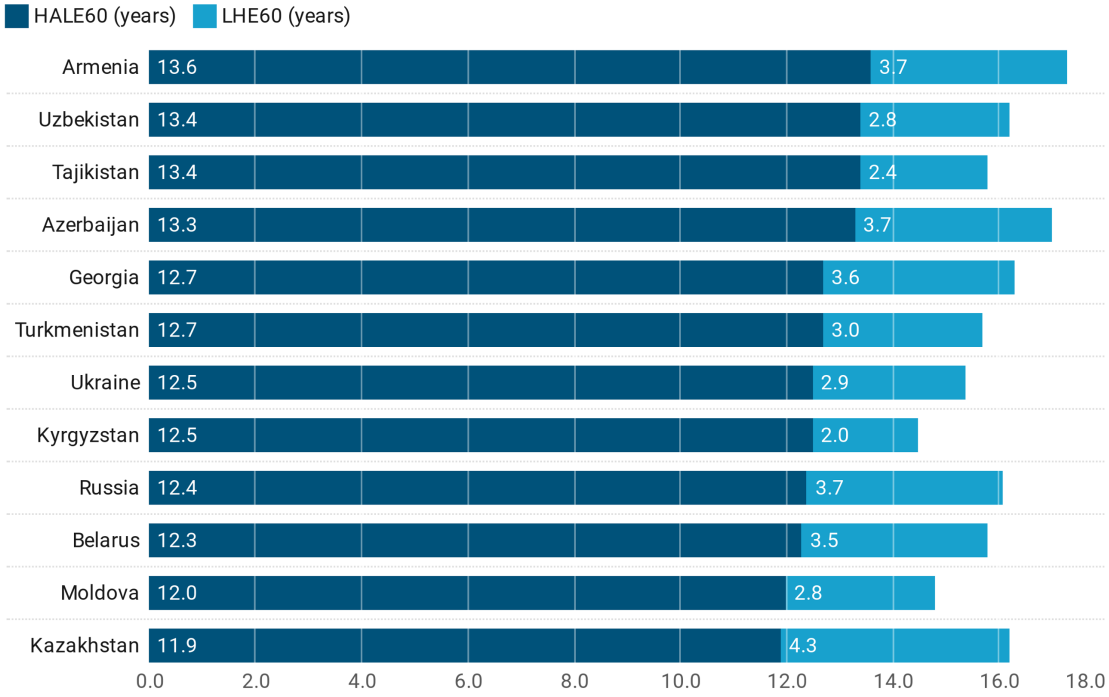
Notes: LHE60 – the equivalent lost healthy years at age 60. Data for LE60 is for 2015–2020 and for HALE60 it is for 2016.

Source: United Nations (2019b); WHO (2020b).

LE60 differs considerably between females and males in the studied countries as observed from Figures 5 and 6. So does HALE60. The divergence ranges from 3.6 years (in Tajikistan and Turkmenistan) to as much as 5.2 years (in Armenia) for LE60 and from 1.7 years (in Moldova) to 3.6 years (in Belarus) for HALE60.

The longest male LE60 in the region is witnessed by the males in Armenia estimated at 17.3 years and the shortest in Kyrgyzstan – 14.5 years (Fig. 6). Albeit, 86% (12.5 years) of these 14.5 years, Kyrgyz males spend in good health which is the highest proportion among males in the studied countries. Similar to females, the lowest proportion (74%) spent in good health is observed in Kazakhstan. On average, older males aged 60 and over in Asian countries of the former Soviet Union enjoy not just longer remaining life expectancy but also more years in good health compared to European countries. For females the estimates show the opposite outcome.

Fig. 6 – Healthy life expectancy at age 60 (HALE60) and life expectancy at age 60 (LE60 = HALE60 + LHE60) in post-Soviet countries, males, latest available year



Notes: Ibid.

Source: United Nations (2019b); WHO (2020b).

The main reason for the low LEB in the studied countries of the former Soviet Union is high burden of premature mortality, especially among adult males. In Russia and Ukraine, for instance, based on the United Nations (2019b) mortality estimates a 15-year old male had nearly 30% probability of dying before reaching the age of 60 years in 2020. For comparison, in Europe the rate was twice as low in 2020. Armenia, Azerbaijan, Tajikistan and Uzbekistan are the only countries among the twelve studied post-Soviet states where the rate is comparative to the European average with 18%, 15%, 17% and 17% chances of dying among adult males respectively.

7.1.3 Role of migration

Replacement migration, as discussed in Sub-chapter 2.2, is not a solution to reverse the ageing process. Even in case of Russia, the country with the highest positive net migration in the post-Soviet space, replacement migration cannot be relied on in terms of reversing current demographic trend of ageing and population decline according to the projections carried out by Vishnevsky (2000). The author estimated that depending on the scenario (with a zero-net migration, with a rising population size and with a constant population size across the 2000–2050 period), the volume of required immigration flow should range within 34.5–117.6 million during the period of 2000–2050 which is not feasible in reality considering current immigration volume in Russia.

Post-Soviet countries are, contrariwise, affected by large emigration flow where in Eastern Europe it is combined with natural population decrease, having no parallels anywhere worldwide

(Botev 2012; Sidorenko 2016; Zaidi, Bennett and Sumner 2017). Based on World Migration Report 2020 of IOM (2019), Russia had the largest migration outflow of 10 million people in Europe and Kazakhstan was among the top ten emigrant countries in Asia with 4 million persons. At the same time, Russia remains to be the main destination country in Eastern Europe with 11.6 million immigrants in 2019. Most importantly, those migrants come mainly from other countries of the former Soviet Union: over 3 million migrants from Ukraine, around 2.5 million from Kazakhstan and 1.1 million from Uzbekistan.

According to Sidorenko (2016), positive net migration has contributed to avoiding the depopulation in Europe during 2000–2015 and at the same time has somewhat influenced the acceleration of the ageing process in some Eastern European countries with high emigration flows. During 2015–2020, most of the studied countries apart from Azerbaijan, Belarus, Russia and Ukraine had negative net migration rates (United Nations 2019b). The fact that majority (74% of all international migrants in 2019) of migrants are of working age (20–64 years), massive emigration combined with low fertility leads to changes in population age structures and aggravates the effects of ageing in the countries of the former Soviet Union to some extent (Botev 2012; IOM 2019; Sidorenko 2016).

7.2 Age-sex structure changes

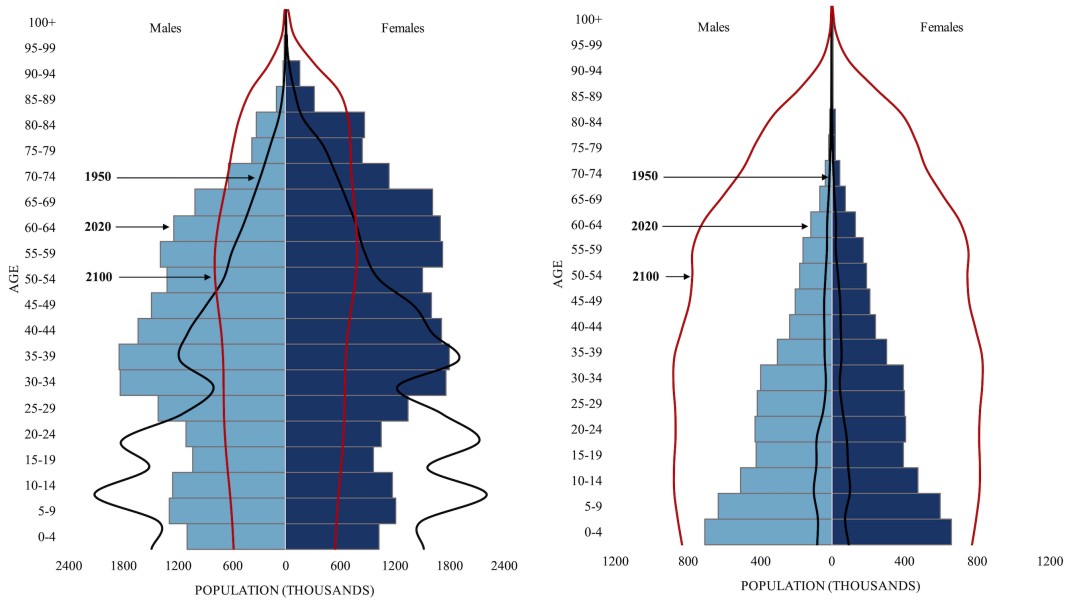
Being one of the most significant demographic characteristics, age structure has a causal nexus with almost all population processes. There is a close relation of the extent and timing of age structure changes established during the demographic transition process and subsequently observed in the context of population ageing.

The fundamental transformations in the age structures influenced mainly by the changes in fertility and mortality lead to irreversible changes in a population pyramid. The studied countries have heterogenous age structures despite their common Soviet history where in 1950 the heterogeneity was not so pronounced while countries had similar pyramidal shapes with wide base and narrow top. Population pyramids are illustrated in four groups based on country's population size for adequate representation (see Appendices 1.1–1.5). Figure 7 demonstrates the pyramids of Ukraine and Tajikistan – countries with the oldest and youngest age structures in 2020.

As seen from Figure 7, Ukraine has high proportion of working-age population and considerably high proportion of older population which results in a regressive type of population pyramid. In 2020, older population of 65 and over constituted 16.9% of total population which ranked the country as an already "aged" society based on UN definition. The pyramid is significantly distorted between males and females at older ages with higher number of females. Further analysis on imbalances in the sex structure of older population is carried out below in Section 7.2.2. Based on UN medium fertility projections, Ukrainian population is expected to shrink by 2100 with higher percentages of older population and smaller percentages of younger population resulting in beehive-shaped population pyramid.

Tajikistan, on the contrary, had the youngest age structure among the studied countries of the former Soviet Union in 2020 where the proportion of older population aged 65 and over constituted a mere 3.2% (Fig. 7). As demonstrated in Figure 8, population size and age structure of Tajikistan is expected to undergo striking changes. Population is projected to nearly triple from 9.3 million in 2020 to 25.3 million in 2100. Youthful age structure with wide base is projected to transform, with considerable increase in the proportion of working-age and older population.

Fig. 7 – Population pyramids of Tajikistan and Ukraine, 1950, 2020, and 2100



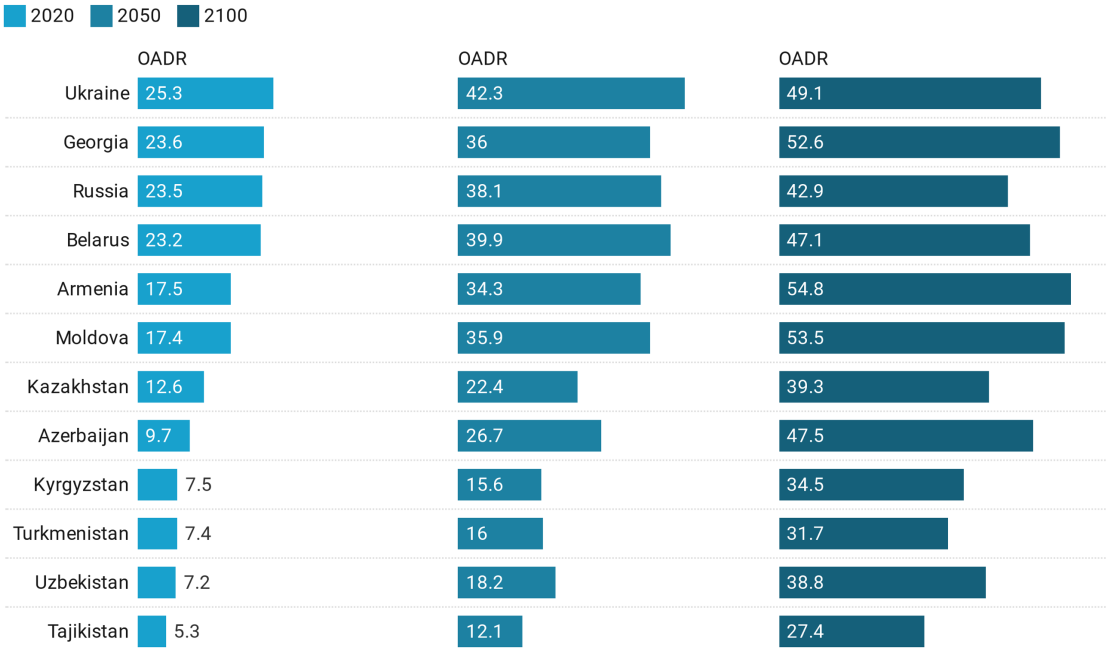
Source: Author's calculations using the data from United Nations (2019b).

Median age indicates the degree of the ageing process dividing the population into two equal parts including the younger and older halves (Pison 2009). In 1950 the median age of the world population was approximately 24 years which has increased by 7 years during the last 7 decades reaching 31 years in 2020 and is estimated to approach 36 years by mid-century and nearly 42 years by end of this century. In the studied countries median age ranged between 22 years (in Azerbaijan) and 28 years (in Ukraine) back in 1950. Today the highest median age in the region is observed in Belarus and Ukraine where it has just passed the threshold of 40 years. The lowest median age of 22 years is reported in Tajikistan where it has not changed since 1950 but estimated to increase by 5 years towards 2050 (United Nations 2019b).

7.2.1 Old-age dependency ratio

One of the most commonly used indicators of population ageing is the old-age dependency ratio (OADR). While not ideal, it adequately reflects the processes of ageing and is a useful comparative indicator when analysing different sets of populations (Reher 2015). OADR is an essential indicator used to analyse and project economic growth and sustainability of social security at the national and regional levels (Sidorenko 2010). Globally, OADR was at 8% in 1950 which has increased to 14% by 2020 and is estimated to reach 25% and as much as 38% by 2050 and 2100 respectively.

Fig. 8 – Old-age dependency ratio (OADR) in post-Soviet countries, 2020, 2050, and 2100



Note: Sorted in descending order by the year 2020.
Source: United Nations (2019b).

As observed from Figure 8, in 2020, the highest OADR among post-Soviet countries was observed in Ukraine where there were around 25 individuals aged 65 and over per 100 persons of working age. The rate in Ukraine is expected to increase to as much as 42.3% towards 2050 and nearly 50% by 2100. The lowest rate, conversely, is observed in Tajikistan with only 5 to 100 ratio which is estimated to more than double by mid-century to 12 to 100 ratio and reaching approximately 27 to 100 by end of the century.

Once again, Asian part of the post-Soviet space (apart from Armenia and Georgia in this case) has, presently, the lowest rates of approximately 8% on average though the situation is expected to change drastically since the number of older individuals aged 65 and over per 100 persons of working age is going to more than double during both periods and is to reach around 37% by the end of the century. Contrariwise, Ukraine, Belarus and Russia are set to face the acceleration (though not with same high intensity as in the studied Asian countries) towards 2050 reaching the highest OADR among the countries of the former Soviet Union of approximately 42%, 40% and 38% accordingly, and slowdown in pace towards the end of the century.

The elements that ensure the sustainability of social security, by any means, revolve around workforce (Sigg 2005). Whereas rising OADR in light of population decline and population ageing process entails inevitability of social security crisis which could be mitigated through timely population policies (May 2015; Sigg 2005; van Praag, van Dalen and Lutz 1994). Current policy context in the studied countries as well as policy recommendations are analysed further in in Chapter 9.

7.2.2 Imbalances in the sex structure of older population

The process of population ageing is not "gender-neutral" (Mirkin and Weinberger 2001). Substantial improvements in life expectancy coupled with higher male mortality over the course of life result in a typically lower number of males compared to females at older ages which is more aggravated at oldest old ages. Worldwide, at the ages of 65 and over there were 78 males per 100 females back in 1950 which has increased to 82:100 ratio in 2020 and is expected to reach 85:100 ratio by the mid-century. There are larger differences in sex structure of older population in MDCs where there were 74 males for every 100 females in 2020 compared to 91:100 ratio in LDCs. The gap between MDCs and LDCs is expected to reduce from current 17 years to 4 years by 2050 when the ratios would be estimated at 81 and 86 males per 100 females respectively. At oldest old ages, female advantage is even more pronounced as in MDCs there are only 57 males for every 100 females. In LDCs the ratio is comparatively higher with on average 68 males per 100 females. By 2050, the rates among oldest old in MDCs and LDCs are projected to reach similar levels of 70–71 males per 100 females.

Tab. 1 – Sex ratio (males per 100 females) at ages 65+ and 80+ in post-Soviet countries, 1950, 2020, 2050, 2100

	1950		2020		2050		2100	
	65+	80+	65+	80+	65+	80+	65+	80+
Belarus	56	43	49	29	61	40	81	69
Russia	47	38	49	32	59	40	79	68
Ukraine	47	36	50	34	60	38	78	67
Kazakhstan	87	68	55	39	65	44	85	73
Moldova	56	42	59	38	62	36	78	63
Georgia	68	52	59	44	62	44	82	73
Kyrgyzstan	86	66	60	34	64	29	81	61
Armenia	76	61	64	54	60	44	82	76
Turkmenistan	91	74	69	54	69	50	71	53
Azerbaijan	74	62	72	55	75	54	91	80
Uzbekistan	98	82	77	60	75	54	83	68
Tajikistan	101	97	86	74	77	57	88	75

Note: Sorted in ascending order by sex ratio at the age 65+ in 2020.
Source: United Nations (2019b).

Table 1 demonstrates significant heterogeneity of the studied countries in terms of sex structure of older population. The lowest imbalances are observed in Tajikistan where at the ages

65 and over there were 86 males for every 100 females while at the ages 80 and over there were 74 males per 100 females. In Belarus, conversely, the observed imbalances are the highest among the countries of the former Soviet Union with as low as 49:100 and 29:100 ratios for ages 65 and over and 80 and over accordingly. Ratios of Belarus are closely followed by those of Russia and Ukraine.

According to United Nations (2019b) medium fertility projections, in four studied countries including Belarus, Russia, Ukraine and Kazakhstan sex ratios for both age groups are going to increase towards 2050 narrowing the imbalance gap in sex structure of older population. In Moldova, Georgia, Kyrgyzstan and Azerbaijan the sex ratios are estimated to increase only for ages 65 and over. In Armenia, Turkmenistan, Uzbekistan and Tajikistan the ratios are expected to decrease or stay unchanged towards mid-century for both age groups.

The lowest sex ratios observed in Belarus, Russia and Ukraine result in high numbers of widowed older females which is not expected to improve dramatically in the coming decades (Botev 2012). This demographic trend has far-reaching social implications: provision of care for widowed females with no immediate family will be a challenge as institutional care is deficient in the countries of the former Soviet Union; on the other hand, isolation and solitude in widowhood can negatively affect the health of older females (Botev 2012; Sidorenko 2016).

Policies dealing with population ageing need to address large gender-differential in various aspects where females are disadvantaged in order for older females to attain better quality of life in old age (May 2015; Balachandran et al. 2020). UNECE (2020) policy brief dedicated to gender equality in ageing societies stresses the point that to achieve equity, measures should be taken at every stage of life to avoid inequalities accumulation which affect primarily females.

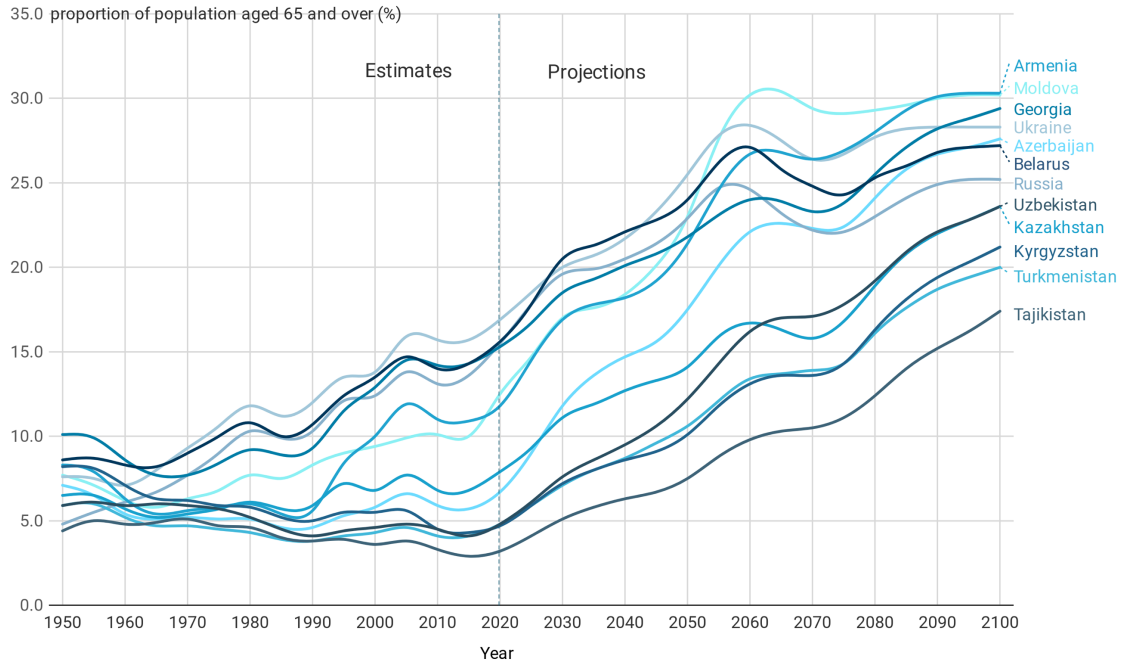
7.3 Quantum and tempo of population ageing

7.3.1 Dynamics of ageing processes

It was in 2020 when the proportion of older population in LDCs have crossed the threshold of 7% according to the United Nations (2019b) estimates. It is expected to reach 14% in mere three decades by around 2050 when LDCs will transit into already “aged” societies. MDCs, in contrast, required more than half a century for the proportion of the older population to grow from 7% to 14%.

Countries of the former Soviet Union can be divided into three groups in terms of the current proportion of older populations: those with young age structures, the “ageing” countries with proportions between 7% and 14%, and the already “aged” ones where the proportion exceeds 14% (Tab. 2). This age group, though, did not grow steadily in the studied countries throughout the last seven decades observed in this study. The dynamics of the proportion of population aged 65 and over since 1950 demonstrated in Figure 9 shows that majority of countries apart from Belarus, Russia and Ukraine have experienced a considerable plunge. This trend is a result of the fertility transition that started in the studied Asian countries much later, during 1960–1970, compared to European ones, as well as the adverse mortality trends experienced after the collapse of the Soviet Union (discussed in Sub-chapter 7.1).

Fig. 9 – Proportion of population aged 65 and over in post-Soviet countries, 1950–2100



Source: United Nations (2019b).

In 2020, Tajikistan had the youngest age structure with only 3.2% of older people, albeit, according to United Nations (2019b) medium fertility projections, the proportion is set to reach 7.5% by mid-century and 17.4% towards 2100 (Tab. 2). Tajikistan, along with Azerbaijan, Kyrgyzstan, Turkmenistan and Uzbekistan demonstrate one of the highest growth rates among older population proportions in post-Soviet countries exceeding 100% growth during 2020–2050. During the second half of the century, the growth rates in Kyrgyzstan and Tajikistan are expected to remain as high at around 110% and 132% respectively, while Azerbaijan, Turkmenistan and Uzbekistan should experience a considerable slow down where in Azerbaijan the growth rate should be nearly three times lower from 154% to 58%. Azerbaijan is the only country in Group I which is estimated to transition from a society with a relatively young age structure with 6.7% of individuals aged 65 and over to already "aged" one with 17.5% of individuals aged 65 and over within a mere of three decades during 2020–2050.

As seen from Table 2, three studied countries including Kazakhstan, Armenia and Moldova belonging to the second group are already in the phase of "ageing" – with 7.9%, 11.8% and 12.5% of persons aged 65 and older respectively – which will transition to already "aged" societies – with 14.1%, 21.4% and 23.0% accordingly – by 2050. Growth rates of older population proportions in those three countries are estimated to vary between 79% and 84% during 2020–2050 and slow down considerably during the second half of the century with expected range between 31% and 67%. Towards 2100, Armenia and Moldova are predicted to have the oldest age structures among the studied countries of the former Soviet Union where nearly one third of population would be 65 or older.

Group III consisting of Belarus, Georgia, Russia and Ukraine had the oldest age structures in 2020 with 15.3%, 15.5%, 15.6% and 16.9% of older populations accordingly. The growth rate of older population proportions in those four countries is estimated to range between 43% and 54%

during the next three decades and is assumed to significantly slowdown in Belarus, Russia and Ukraine during the second half of the century with 10–13% growth. As a result, the proportion of individuals aged 65 and over is estimated to constitute approximately a quarter of total population in Belarus, Russia and Ukraine in 2050 and is predicted to further gain only 2 to 3 percentage points by 2100. Ukraine, being the oldest country in the post-Soviet space in 2020 is projected to remain so in 2050 but is to concede its "leading" position to Armenia and Moldova by 2100.

Tab. 2 – Growth rate of older population proportion in post-Soviet countries, 2020, 2050, 2100

Countries	Proportion of population 65 and over (%)			Growth rate (%)	
	2020	2050	2100	2020–2050	2050–2100
Group I					
Tajikistan	3.2	7.5	17.4	134	132
Kyrgyzstan	4.7	10.1	21.2	115	110
Turkmenistan	4.8	10.6	20.0	121	89
Uzbekistan	4.8	12.2	23.6	154	93
Azerbaijan	6.7	17.5	27.6	161	58
Group II					
Kazakhstan	7.9	14.1	23.6	79	67
Armenia	11.8	21.4	30.3	81	42
Moldova	12.5	23.0	30.2	84	31
Group III					
Georgia	15.3	21.8	29.4	43	35
Russia	15.5	22.9	25.2	48	10
Belarus	15.6	24.0	27.2	54	13
Ukraine	16.9	25.5	28.3	51	11

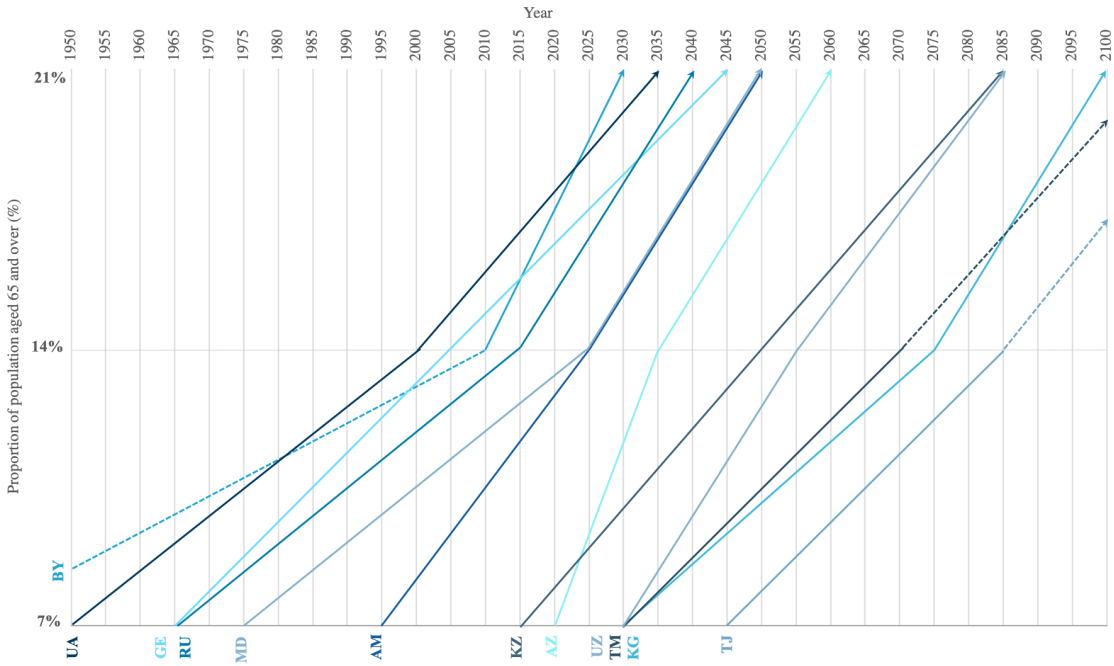
Note: Sorted in ascending order by the proportion of older population aged 65 and over in 2020.

Source: United Nations (2019b).

It is of utter importance to consider not only the changes in levels but also the quantum and tempo of population ageing as difficulties of adjusting to demographic changes increase with higher quantum and tempo of the process. As mentioned earlier, there is no uniform measure of the quantum and tempo of population ageing in demography. Most of the authors just analyse different relevant indicators like OADR, median age, ageing index, etc. Few existing studies measure the "speed" of ageing through the number of years required or expected for the older proportion of population to rise from 7% to 14%. In this study we went further by analysing the quantum and tempo of population ageing through the percentage point increase per year and for two thresholds, i.e., 7% to 14% and 14% to 21% since only the first one does not provide a full

picture on the process towards already "aged" society and the quantum and tempo is not uniform throughout the whole course.

Fig. 10 – Quantum and tempo of population ageing in post-Soviet countries, 1950–2100



Source: United Nations (2019b).

The studied countries of the former Soviet Union are geographically heterogenous in terms of the quantum and tempo of the ageing process as illustrated in Figure 10. At the same time, the quantum and tempo of ageing is not uniform through both phases for most of the countries. Linear trend is observed only in Georgia and Kazakhstan where it took 40 (during 1965–2005 and 2005–2045) and 35 years (during 2015–2050 and 2050–2085) respectively for the proportion of older population (65+) to grow both from 7% to 14% and from 14% to 21% resulting in the same quantum and tempo of 0.18 and 0.20 percentage points per year for Georgia and Kazakhstan accordingly.

Lack of data prior 1950 does not allow to estimate the quantum and tempo of ageing for Belarus during the first threshold of 7% to 14% since by 1950 the proportion of older population (65+) has already reached 8.6%. For Tajikistan and Turkmenistan, on the contrary, at this point it is not possible to calculate the quantum and tempo of the process during the second phase of increase from 14% to 21% since according to current medium fertility projections the proportion of older population is expected to reach only 17.4% and 20.0% by 2100.

The lowest quantum and tempo of ageing at 0.14 percentage points per year was observed in Moldova, Russia and Ukraine during the first phase of increase, i.e., from 7% to 14% lasting (or expected to last) 50 years during 1975–2025, 1965–2015 and 1950–2000 respectively. The process of demographic transition was long and has already completed in those three countries along with Belarus which resulted in earlier start of population ageing and its lower quantum and tempo compared to other countries of the post-Soviet space. During the second phase of increase from 14% to 21%, the quantum and tempo is projected to increase considerably for all four

countries: Ukraine – 0.20 percentage points per year (during 2000–2035), Moldova – 0.28 percentage points (2025–2050), Russia – 0.28 percentage points (2015–2040) and Belarus – 0.35 percentage points (2010–2030).

In Kyrgyzstan, Tajikistan and Turkmenistan the quantum and tempo of ageing is expected to vary between 0.16 and 0.18 percentage points throughout the first phase but markedly later – during 2030–2075 for Kyrgyzstan, 2030–2070 for Turkmenistan and 2045–2085 for Tajikistan. As aforesaid, it is not possible to define the quantum and tempo of ageing for Tajikistan and Turkmenistan during the second phase, but in Kyrgyzstan it should increase dramatically and the proportion of older population (65+) is projected to grow from 14% to 21% in just 25 years at an average quantum and tempo of 0.28 percentage points per year.

The highest quantum and tempo of population ageing during both phases is estimated to or being experienced by Armenia, Uzbekistan and Azerbaijan. Armenian population is ageing with a quantum and tempo of 0.23 percentage points during the first phase and is expected to age further from 14% to 21% with a quantum and tempo of 0.28 percentage points per year during 2025–2050. Uzbek older population (65+) proportion, on its turn, is estimated to grow from 7% to 14% in 25 years (2030–2055) with an average quantum and tempo of 0.28 percentage points per year followed by a slowdown to 0.23 percentage points during the second phase. Finally, Azerbaijan has just entered the first phase of the ageing process in 2020 and is expected to experience the quantum and tempo of ageing at 0.47 percentage points, the highest observed among the post-Soviet space. Which means that the proportion of older population (65+) will increase from 7% to 14% in mere 15 years here. During the second phase of population ageing process, the growth is projected to decelerate where the threshold of 21% should be reached with the quantum and tempo of 0.28 percentage points per year.

Overall, the average quantum and tempo of population ageing among the studied countries is estimated at 0.21 percentage points per year during the first phase of 7% to 14% increase and 0.26 percentage points during the second phase of 14% to 21% increase. This implies the acceleration of population ageing among the countries of the former Soviet Union during the second phase of transition towards “aged” society. Though, when looking at Asian and European parts of post-Soviet space separately, the picture is quite contrasting. In European countries including Georgia, the ageing process has commenced earlier and with a considerably low quantum and tempo of 0.15 percentage points during the first phase while during the second phase the quantum and tempo is estimated to nearly double averaging at 0.26 percentage points per year. In Asian part, on its turn, the process of ageing is expected to run later and with a high quantum and tempo from the beginning: at 0.24 percentage points per year during the first phase of 7% to 14% increase and 0.25 percentage points during the second phase of 14% to 21% increase.

The analysis results for the first phase of population ageing confirm the hypothesis II stating that the timing and extent of age-structural shifts are closely related and are more pronounced in Asian countries of the former Soviet Union which are experiencing higher quantum and tempo of ageing compared to European countries. However, the projections indicate that during the second phase of population ageing, the studied countries are expected to experience analogous quantum and tempo of the process.

7.3.2 Classification of ageing processes

Hierarchical agglomerative clustering with Ward's linkage was used to identify and visualize the homogeneity of the studied countries of the former Soviet Union based on the indicators of demographic change in the context of population ageing. The analysis was carried out for twelve countries studied throughout this research.

The analysis was performed using seven variables: TFR, LEB, HALE60, OADR, median age, quantum and tempo of population ageing during the first phase of 7% to 14% increase and quantum and tempo of population ageing during the second phase of 14% to 21% increase. The input data is presented in Appendix 2.

The data set contained three missing values: quantum and tempo of ageing during the first phase for Belarus and quantum and tempo of ageing during the second phase for Tajikistan and Turkmenistan for the reasons explained in the previous section. The missing values have been replaced with the series mean in SPSS.

Tab. 3 – Agglomeration schedule of hierarchical clustering

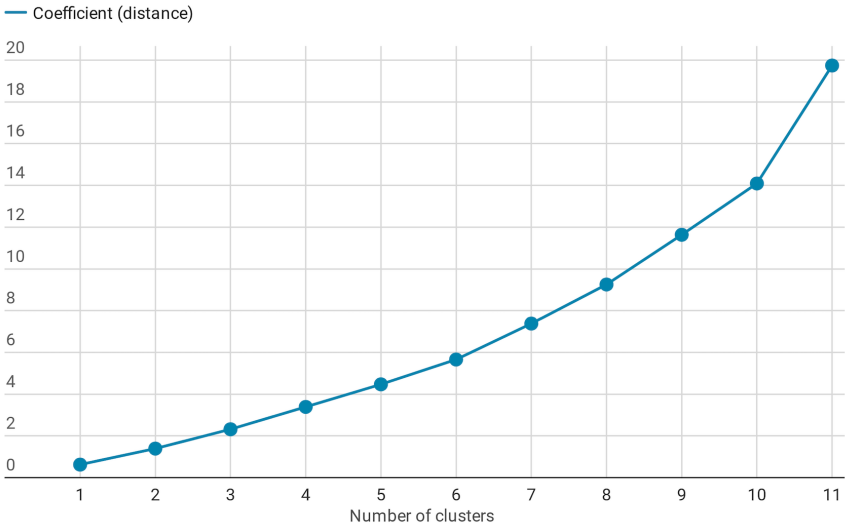
	Cluster Combined			Stage Cluster First Appears		
Stage	**Cluster I**	**Cluster II**	**Coefficients**	**Cluster I**	**Custer II**	**Nest Stage**
1	6	9	0.623	0	0	6
2	4	11	1.391	0	0	8
3	1	3	2.317	0	0	4
4	1	8	3.388	3	0	9
5	5	12	4.468	0	0	7
6	6	10	5.658	1	0	7
7	5	6	7.379	5	6	10
8	4	7	9.252	2	0	9
9	1	4	11.633	4	8	11
10	2	5	14.092	0	7	11
11	1	2	19.743	9	10	0

Source: Author's calculations in SPSS.

The agglomeration schedule in Table 3 displays how the clusters were formed during the analysis. Cluster 6 (Kyrgyzstan) and cluster 9 (Tajikistan) were combined at first stage, for instance, because the Euclidean distance between them was the smallest out of all pairs. Since there were n = 12 cases (countries) in the data, the analysis was performed in n – 1 = 11 stages. The first largest jump in the coefficients of two consecutive stages is observed between stages 10

and 11 with a difference of 5.651. Hence, the best solution is to stop the clustering at stage 10 after which the clusters are being merged with increased heterogeneity. The choice is visually confirmed by the "elbow" in the scree plot indicating a two-cluster solution (Fig. 11).

Fig. 11 – Scree plot of hierarchical clustering



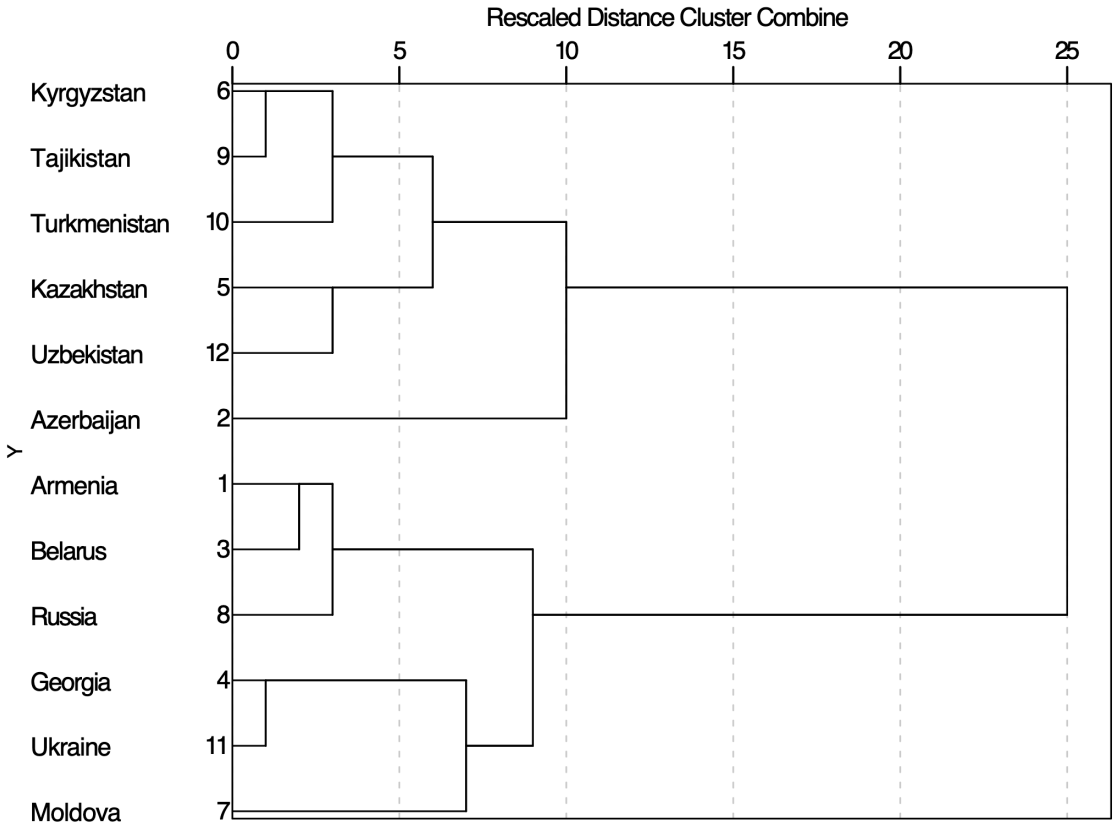
Source: Author's calculations in SPSS.

The two-cluster solution is illustrated in the dendrogram (Fig. 12). The first cluster consists of Armenia, Belarus, Georgia, Moldova, Russia and Ukraine. The second cluster consists of the remaining six countries of the post-Soviet space: Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. To get a better overview of the results, cluster centroids of selected variables are analysed based of the output demonstrated in Table 3.

The first group comprised of mainly European countries is characterized by lower fertility (mean value of TFR is 1.67 live births per woman) since those countries have completed the process of demographic transition and the TFR has fallen below replacement level. Asian countries grouped in the second cluster have a mean value of TFR at 2.8 live births per woman since those countries have just entered the last stage of the demographic transition.

Mean LEB of 73 years among this cluster of countries is higher (approximately 2 years difference with second cluster) but not considerably mainly due to high excess mortality among males, especially pronounced in Moldova, Russia and Ukraine affecting average LEB despite higher female longevity. HALE60 is practically identical in both first and second cluster of countries with mean values of 14.7 years and 14.2 years respectively.

Fig. 12 – Dendrogram using Ward's linkage illustrating grouping of post-Soviet countries based on the indicators of demographic change in the context of population ageing



Source: Author's calculations in SPSS.

Mean values for OADR differ significantly between the two clusters. It is more than two-fold higher for European countries compared to Asian ones with 21.8 versus 8.3 accordingly. The median age is 11 years higher in cluster one compared to the second cluster. Finally, the quantum and tempo of ageing during the first phase is lower for European countries while during the second phase of the ageing process it is almost same high. Since the input data for cluster analysis did not contain any outliers, standard deviation gives a reliable picture. The highest amount of variation from the mean values in both clusters is observed for OADR and median age.

Tab. 4 – Descriptive statistics of within-subject factor levels

Ward Method	Dependent Variables	Mean	Std. Deviation	N
1	TFR	1.67	0.29	6
	LEB	73.11	1.38	6
	HALE60	14.68	0.52	6
	OADR	21.75	3.39	6
	Median age	38.72	2.10	6
	Q and T (threshold I)	0.17	0.04	6
	Q and T (threshold II)	0.26	0.06	6
2	TFR	2.78	0.73	6
	LEB	71.25	2.63	6
	HALE60	14.23	0.42	6
	OADR	8.29	3.54	6
	Median age	27.68	4.97	6
	Q and T (threshold I)	0.24	0.17	6
	Q and T (threshold II)	0.25	0.04	6

Source: Author's calculations in SPSS.

Overall, the results of cluster analysis reveal that population ageing is more advanced in the first group of countries based on all selected variables without exception. Though, the first group of countries is ageing without significant improvements neither in mortality nor in remaining healthy life expectancy at older age. The results of the hierarchical cluster analysis also confirm the hypotheses I and II since the two-cluster solution presented in the dendrogram has distinguished the homogeneity of countries, based on the studied demographic indicators measuring the extent of age-sex structural shifts in the context of population ageing process, that directly correlated with their location: first group with European countries and second group with Asian countries of the post-Soviet space.

Chapter 8

Challenges and opportunities of population ageing

Health and longevity of population are among the most significant foundations of development (Mirkin 2005). This is especially relevant for post-Soviet countries where life expectancy is lagging behind, particularly among males due to excess adult mortality. Apart from public health, the most pressing concerns in the context of ageing populations are related to labour markets and social protection. It is important for the post-Soviet countries to anticipate the multifaceted risks and challenges associated with the ageing process. Rigorous analysis of health and social indicators is the first step towards successful development of public policy roadmap aimed at mitigating the potential negative effects and seizing the window of opportunity through demographic dividend.

This chapter presents the core step of gap analysis – identification of the gap. Selected health and social indicators of the post-Soviet countries are analysed to identify the existing and upcoming challenges resulting from population ageing.

8.1 Selected health and social indicators in the context of ageing populations

8.1.1 Public health

Understanding population health is of vital importance when it comes to public policy decision making, notably so in the context of population ageing. Evaluation of public health entails the analysis of the two main domains including progress in population health and progress in health care services (Wolfson and Lievesley 2007). Back in the mid-twentieth century, Sanders (1964, p. 1069) questioned how to measure the efficiency of public health arguing that it is imperative to identify the required contribution of health care and resources allocation in order "to maximize productive man-year per life".

With increasing number and proportion of older population it is crucial to comprehend: whether the ageing process is accompanied not only by the increasing longevity but improved and sustained health throughout the life course and at old age; what is the level of the disease

burden in a population and which main causes and risk factors are associated with morbidity and mortality combined; whether the public health system is adjusting to preventing and controlling increasing incidence of NCDs as the main underlying causes of death; what is the extent of health care coverage and financial burden from out-of-pocket spending; and whether health care spending is allocated efficiently in all the domains. Further analysis is addressed to finding answers to the above questions for the post-Soviet countries studied in this research.

Recent developments in measuring population health progress include the increasing use of composite summary indicators combining mortality and morbidity effects of diseases as well as indices used to assess health and well-being in multiple dimensions. A number of health gap measures and health expectancies have been developed to estimate the burden of disease in a population (Hyder, Puvanachandra and Morrow 2012). HALE60 and DALYs have been chosen for this study as the two most widely used composite summary indicators in the context of population ageing research.

Increased life expectancy brings along diverse challenges as longer lives do not always imply healthier lives (Bloom, Mitgang and Osher 2016). In Section 7.1.2 we analysed how HALE at age 60 compared to the remaining LEB at age 60. Here, we would like to look deeper into the change that occurred during 2000–2016 in the average equivalent number of years of full health that an older person could expect to live in the countries of the former Soviet Union.

Tab. 5 – Healthy life expectancy at age 60 (HALE60) in post-Soviet countries, 2000, 2016

	Both sexes			Females			Males		
	2000	2016	2000–2016 change (%)	2000	2016	2000–2016 change (%)	2000	2016	2000–2016 change (%)
Armenia	14.5	15.1	4.1	15.6	16.3	4.5	13.1	13.6	3.8
Azerbaijan	13.7	14.6	6.6	14.7	15.8	7.5	12.5	13.3	6.4
Belarus	12.9	15.1	17.1	14.7	17.2	17.0	10.6	12.3	16.0
Georgia	14.6	14.6	0.0	15.7	16.2	3.2	13.1	12.7	-3.1
Kazakhstan	12.3	13.9	13.0	14.0	15.5	10.7	10.2	11.9	16.7
Kyrgyzstan	13.2	14.2	7.6	14.5	15.6	7.6	11.7	12.5	6.8
Moldova	12.5	13.7	9.6	13.6	15.1	11.0	11.2	12.0	7.1
Russia	12.5	14.9	19.2	14.4	16.7	16.0	10.1	12.4	22.8
Tajikistan	13.7	14.3	4.4	14.1	15.3	8.5	13.2	13.4	1.5
Turkmenistan	13.4	13.9	3.7	14.5	15.0	3.4	12.1	12.7	5.0
Ukraine	12.9	14.7	14.0	14.5	16.4	13.1	10.8	12.5	15.7
Uzbekistan	13.9	14.5	4.3	14.7	15.5	5.4	13.1	13.4	2.3

Source: WHO (2020b).

Table 5 shows that the highest relative positive change of 19.2% in HALE60 during 2000–2016 was observed in Russia for the population as a whole which was mainly due to the very high increase of 22.8% among males compared to lower 16.0% increase for females. Russia is closely followed by Belarus with 17.1% increase for the total population, though females and males here show nearly equivalent increase of 17.0% and 16.0% respectively. Third highest increase among

the twelve countries was celebrated in Ukraine with 14.0% where similarly to Russia the gain was more pronounced among males compared to females with 15.7% and 13.1% accordingly. In Georgia, increasing LE60 was not accompanied by increasing healthy life expectancy since HALE60 remained at the same level in 2000 and more than a decade later in 2016 while for males separately it even decreased by 3.1% and females experienced a 3.2% increase. The lowest increase among post-Soviet countries was observed in Turkmenistan, Armenia, Uzbekistan and Tajikistan within the range of 3.7%–4.4%, where, Turkmen males experienced higher gain compared to Turkmen females while Armenian, Uzbek and Tajik males experienced lower gain. The results indicate that among the twelve former Soviet Union countries, the population ageing process is associated with both increasing life expectancy and considerable healthy life expectancy gains among older population only in Russia, Belarus, Ukraine and Kazakhstan; with average healthy life expectancy gains among older individuals in Moldova, Kyrgyzstan and Azerbaijan; with low increase in healthy life expectancy for older population in Turkmenistan, Armenia, Uzbekistan and Tajikistan; while Georgia is the only country where older people could expect to live longer lives but not necessarily healthier lives during 2000–2016.

Tab. 6 – Age-standardized disability-adjusted life years (DALYs) rate, broken down into years lived with disability (YLDs) and years of life lost due to premature mortality (YLLs), for all causes in post-Soviet countries, 2019 (per 100 thousand population)

	DALYs		YLLs		YLDs	
	1990	2019	1990	2019	1990	2019
Uzbekistan	39 462.40	40 111.38	29 392.69	30 176.50	10 069.72	9 934.89
Tajikistan	45 884.95	37 174.36	36 117.35	27 438.11	9 767.61	9 736.24
Ukraine	35 587.67	35 852.17	24 836.26	25 563.82	10 751.42	10 288.34
Azerbaijan	45 927.78	34 842.40	36 257.18	25 187.13	9 670.60	9 655.27
Turkmenistan	46 881.53	34 674.29	37 132.68	25 123.09	9 748.85	9 551.20
Kazakhstan	41 214.03	32 474.94	30 748.59	22 182.83	10 465.44	10 292.11
Russia	38 239.79	31 110.39	27 128.96	20 702.88	11 110.83	10 407.50
Kyrgyzstan	43 631.56	29 725.44	33 426.97	20 073.40	10 204.60	9 652.04
Georgia	39 478.80	29 683.15	29 801.83	19 588.29	9 676.97	10 094.87
Moldova	40 769.65	28 613.79	30 000.15	18 526.26	10 769.50	10 087.53
Belarus	34 195.08	28 374.76	23 738.19	18 417.76	10 456.89	9 957.00
Armenia	36 862.85	25 752.81	26 555.77	15 990.93	10 307.08	9 761.89

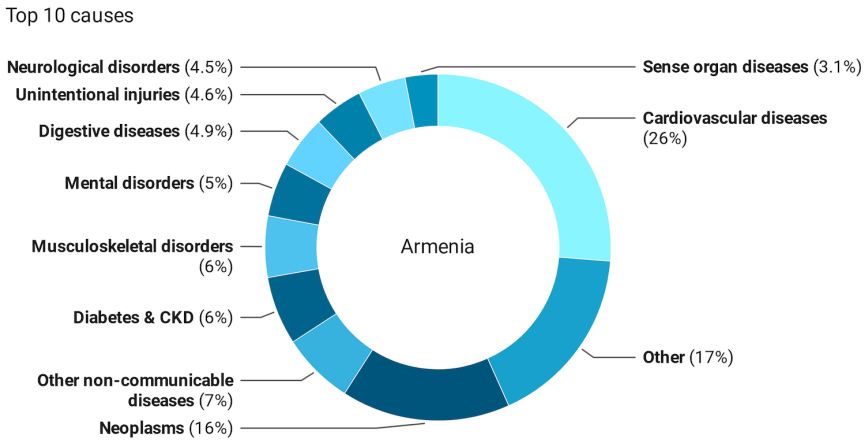
Notes: Sorted in descending order by DALYs in 2019.
Source: IHME (2020).

The observed change in patterns of health and disease around the world occurs in parallel with changes in demographic determinants of population ageing succeeding the process of

demographic transition. The transition from infectious diseases to man-made and generative diseases as the underlying causes of morbidity and mortality, known as the epidemiological transition, was first experienced by the MDCs and is still in progress in LDCs (Omran 1971). Worldwide, the burden of disease attributable to disorders in older individuals aged 60 and over constitutes 23% (Prince et al. 2014). While severe disability is actually declining in some countries, chronic disease and mild disability are increasing roughly universally (Rechel et al. 2009). Mortality rates do not give a complete picture of the disease burden borne by population. The causes and risk factors of mortality and disability combined can be measured using disability-adjusted life years (DALYs) broken down into years of life lost due to premature mortality (YLLs) and years lived with disability (YLDs).

Based on Table 6, Ukraine and Uzbekistan are the only countries where the age-standardized rate of disease burden has increased during 1990–2019 which was mainly due to the increased rate of premature deaths while the number of years lived with disability has slightly decreased for the overall population. The largest decline of DALYs has been observed in Kyrgyzstan with 47% decrease in the total burden of disease which was mainly driven by the reduction in premature death. All of the countries apart from Ukraine and Uzbekistan have experienced considerable reductions in the contribution of premature death (YLLs) during 1990–2019. The proportion of burden due to years lived with disability, however, has decreased only insignificantly in the countries of the former Soviet Union over the last three decades apart from Georgia which saw a slight increase signifying the increased prevalence of disability in the population. For a more detailed analysis of burden of disease in the former Soviet Union populations, it is important to identify the leading causes and risk factors of DALYs.

Fig. 13 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Armenia, 2019



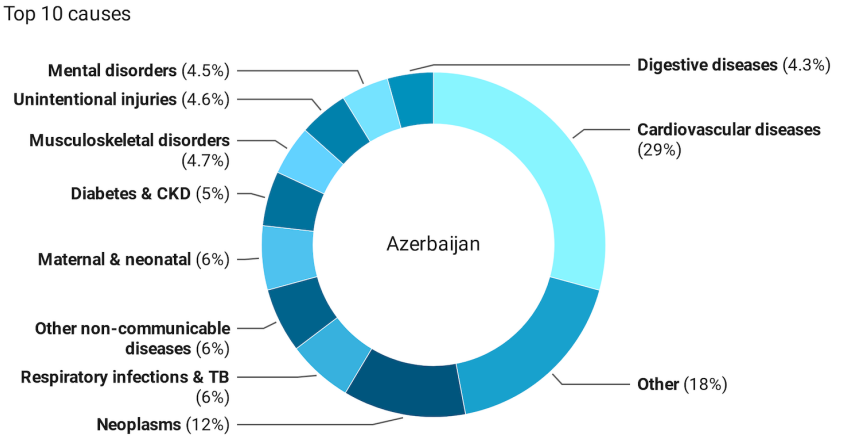
	Top 10 risk factors
1	High blood pressure
2	Tobacco
3	Dietary risks
4	High body-mass index
5	High fasting plasma glucose
6	Air pollution
7	High LDL
8	Kidney disfunction
9	Alcohol use
10	Malnutrition

Notes: Institute for Health Metrics and Evaluation classifies the diseases and injuries into 4 levels hierarchy corresponding to International Classification of Diseases (ICD)-9 and ICD-10 codes. Level 1 contains three large cause groupings comprised of communicable, maternal and neonatal conditions and nutritional deficiencies (CMNN), non-communicable diseases (NCDs) and injuries. Level 2 consists of 21 categories of diseases and injuries. Levels 3 and 4 contain the finest level of detail in causes. Level 2 categories are analysed in this study.
CKD in "Diabetes & CKD" stands for Chronic Kidney Disease; LDL in "High LDL" stands for Low-density lipoprotein cholesterol.

Source: IHME (2020).

Figure 13 shows that cardiovascular diseases and neoplasms are the leading causes of mortality and morbidity among Armenian population representing 42% of total DALYs. Overall, the top 10 causes include mostly NCDs with 5% of unintentional injuries. The dominant drivers of DALYs in Armenia were high blood pressure, tobacco use and dietary risks in 2019. Alcohol use and malnutrition were also in the top ten risk factors for mortality and morbidity.

Fig. 14 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Azerbaijan, 2019

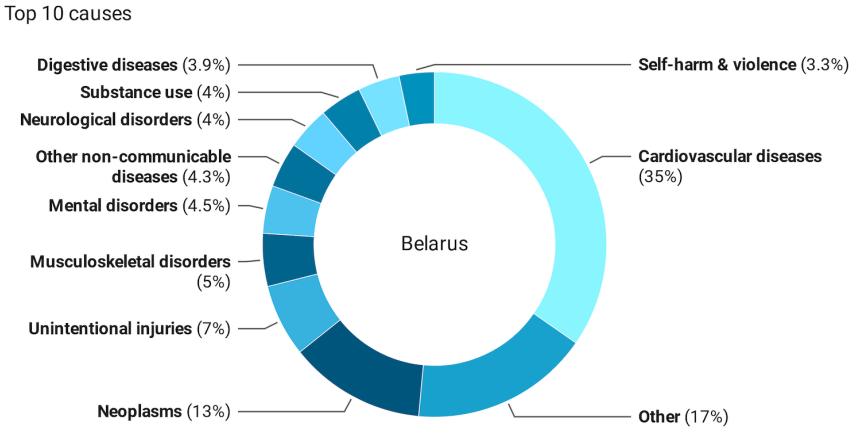


Notes: Ibid; TB in "Respiratory infections & TB" stands for tuberculosis.

Source: IHME (2020).

As seen from Figure 14, cardiovascular diseases and neoplasms were the leading causes of DALYs in Azerbaijan as well, representing 41% of total burden of disease in 2019. Unlike in Armenia though, communicable diseases, i.e., respiratory infections and tuberculosis still occupy a relatively high share as a single top third cause comprising 6% of total causes in Azerbaijanian population. Top ten risk factors in Azerbaijan are comparable to those in Armenia.

Fig. 15 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Belarus, 2019



Notes: Ibid.

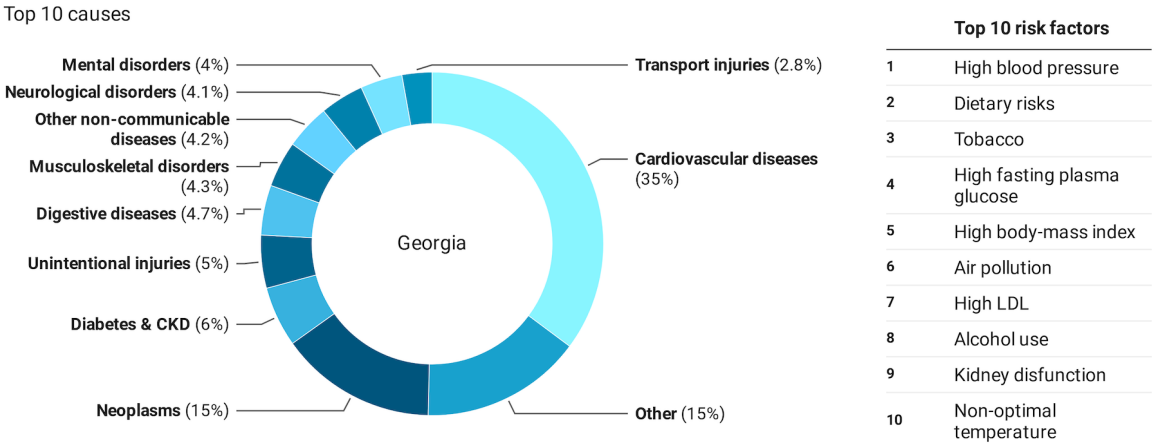
Source: IHME (2020).

In Belarus nearly half of DALYs are caused by cardiovascular diseases and neoplasms (Fig. 15). Communicable diseases do not represent leading causes though substance use is in the

seventh position representing 4% of mortality and morbidity combined. High blood pressure, dietary risks and tobacco are the leading risk factors contributing to 56% of DALYs while alcohol use itself is responsible for over 10% of disease burden.

Figure 16 reveals that approximately half of DALYs were the result of cardiovascular diseases and neoplasms in Georgia in 2019. NCDs were the leading causes of disease burden for Georgian population. Risk factors in Georgia are comparable to the aforementioned countries with high blood pressure, dietary risks and tobacco attributing to more than half of total DALYs.

Fig. 16 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Georgia, 2019

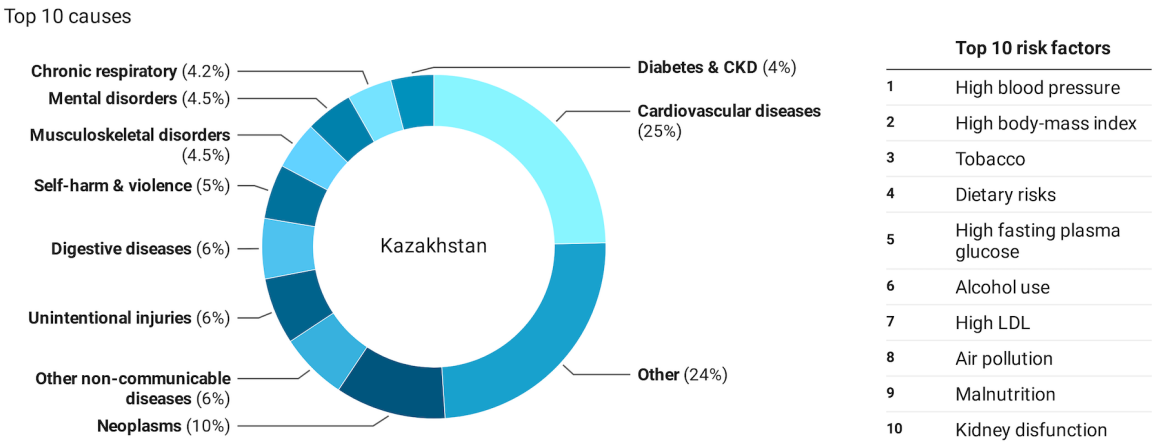


Notes: Ibid.

Source: IHME (2020).

In Kazakhstan, the top two leading causes such as cardiovascular diseases and neoplasms represent around 35% of total DALYs followed predominantly by other NCDs (Fig. 17). Top three risk factors here include high blood pressure, high body-mass index and tobacco where alcohol use occupies sixth leading cause.

Fig. 17 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Kazakhstan, 2019

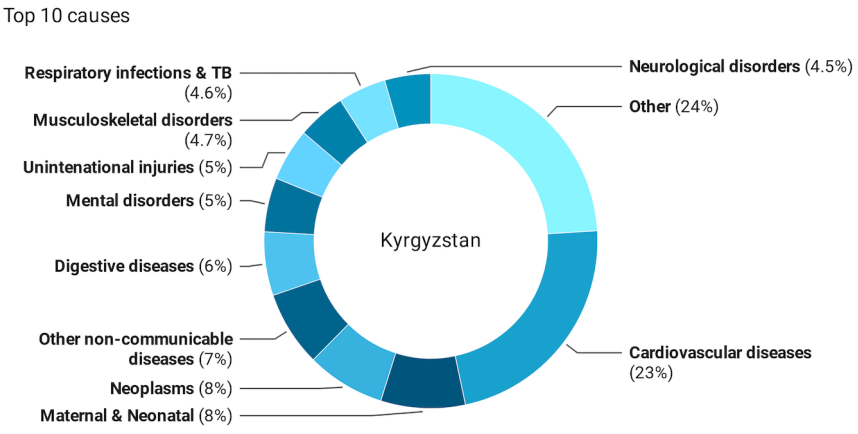


Notes: Ibid.

Source: IHME (2020).

In Kyrgyzstan, unlike in all of the countries above, the second leading cause of mortality and morbidity combined after cardiovascular diseases is maternal and neonatal disorders (Fig. 18). Similar to Azerbaijan, communicable diseases such as respiratory infections and tuberculosis are included in the top ten causes contributing to 5% of total DALYs. Dietary risk factors along with tobacco and high blood pressure are responsible for 32% of disease burden while alcohol use alone is responsible for 8%.

Fig. 18 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Kyrgyzstan, 2019

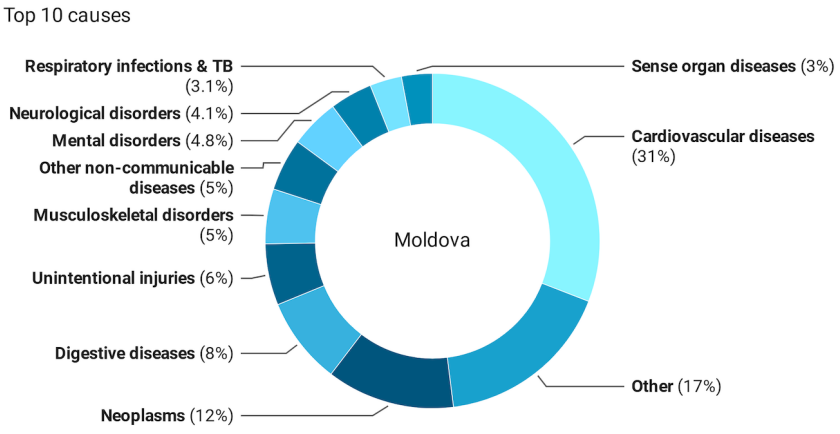


Notes: Ibid.

Source: IHME (2020).

Cardiovascular diseases and neoplasms are the leading causes of morbidity and mortality combined in Moldova as well, constituting 43% of total DALYs (Fig. 19). Analogously to Kyrgyzstan, in Moldova, respiratory infections and tuberculosis are the top ninth cause of disease burden with a contribution of 3%. Top three risk factors including high blood pressure, dietary risks and tobacco were the leading drivers of DALYs in 2019. Alcohol use was responsible for 11% of total DALYs.

Fig. 19 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Moldova, 2019

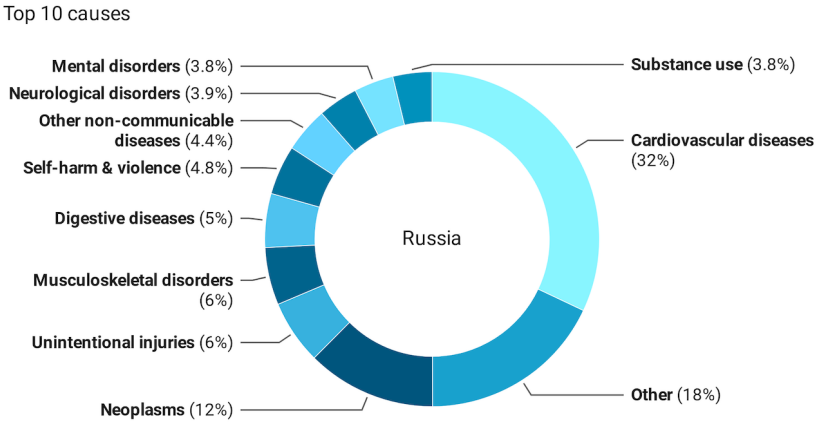


Notes: Ibid.

Source: IHME (2020).

Figure 20 shows that NCDs were the leading causes of mortality and morbidity in Russia in 2019. Around 45% of disease burden was due to cardiovascular diseases and neoplasms. Similar to the countries above, high blood pressure, tobacco use and dietary risks were responsible for approximately 47% of total DALYs while alcohol use alone was responsible for 11%.

Fig. 20 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Russia, 2019



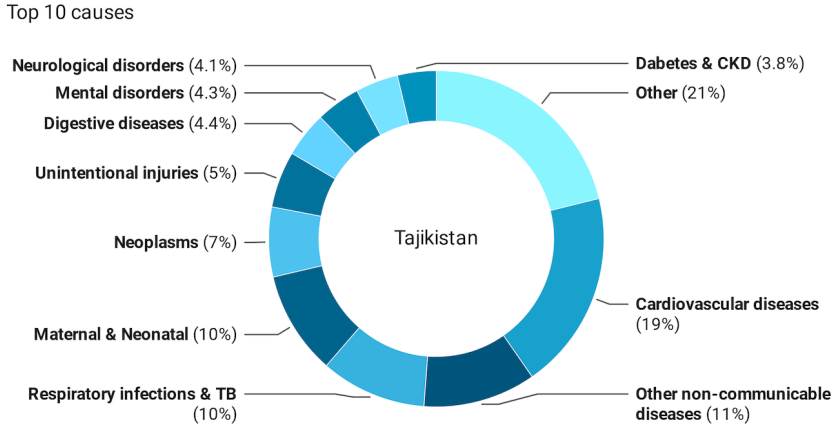
	Top 10 risk factors
1	High blood pressure
2	Tobacco
3	Dietary risks
4	High body-mass index
5	Alcohol use
6	High LDL
7	High fasting plasma glucose
8	Kidney disfunction
9	Air pollution
10	Drug use

Notes: Ibid.

Source: IHME (2020).

In Tajikistan, respiratory infections and tuberculosis are the third leading cause of disease burden after cardiovascular diseases and other NCDs (Fig. 21). Neoplasms here are responsible for a considerably lower share of around 7% of total DALYs. Exposure to risk factors responsible for disease burden in Tajikistan differs significantly from other countries of the former Soviet Union. The leading risk factor here is malnutrition which contributes to approximately 15% of total DALYs followed by high blood pressure with nearly 12% and dietary risks with around 10%. Tobacco use in Tajikistan is responsible for the smallest share of around 7% of total DALYs among the countries of the former Soviet Union. Unsafe water, sanitation and handwashing (WaSH) concludes the top ten list with 3% contribution to disease burden in Tajikistan.

Fig. 21 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Tajikistan, 2019



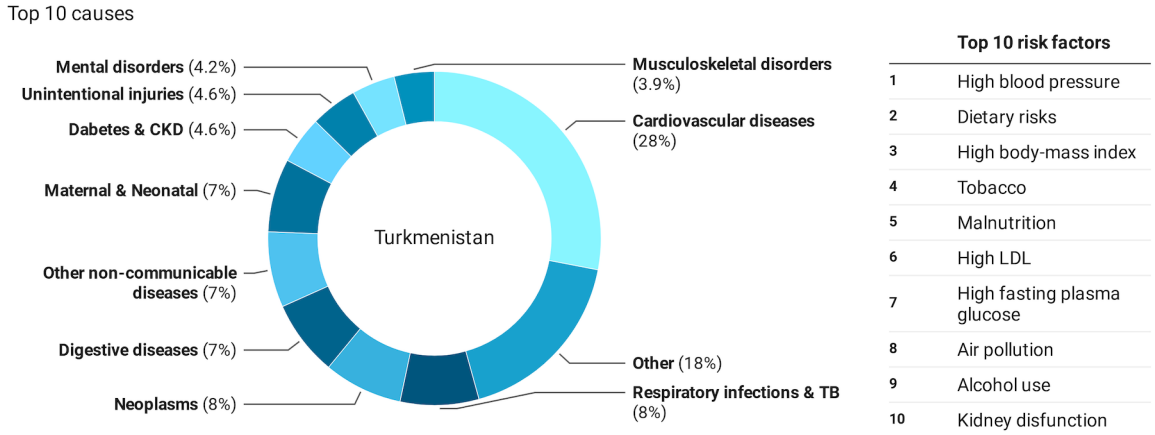
	Top 10 risk factors
1	Malnutrition
2	High blood pressure
3	Dietary risks
4	Air pollution
5	High fasting plasma glucose
6	Tobacco
7	High body-mass index
8	High LDL
9	Alcohol use
10	WaSH

Notes: Ibid; "WaSH" stands for unsafe water, sanitation and handwashing.

Source: IHME (2020).

Cardiovascular diseases, respiratory infections and tuberculosis, and neoplasms are the leading causes of morbidity and mortality combined in Turkmenistan (Fig. 22). Similar to Kyrgyzstan, the top three risk factors here include high blood pressure, dietary risks and high body-mass index which are responsible for 46% of disease burden.

Fig. 22 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Turkmenistan, 2019

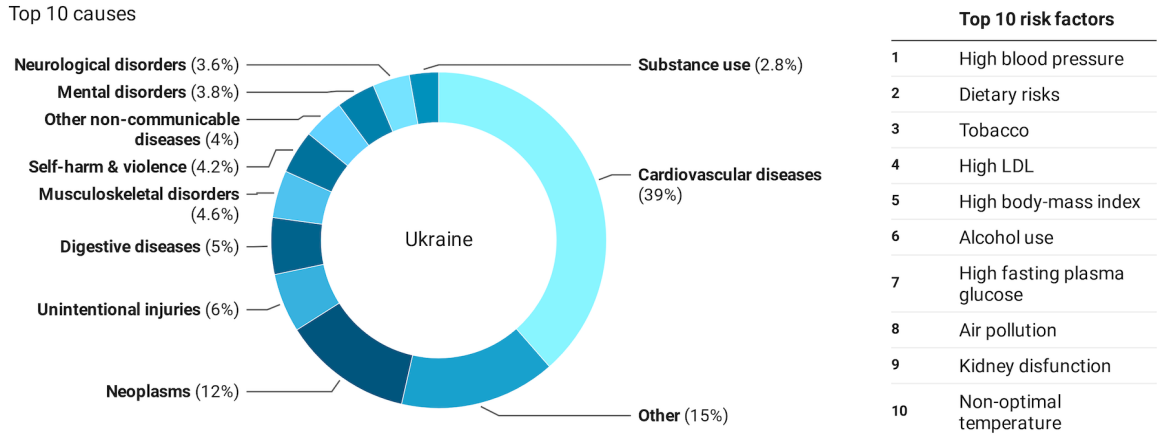


Notes: Ibid.

Source: IHME (2020).

Figure 23 indicates that cardiovascular diseases and neoplasms lead to around 51% of total DALYs. Overall, most of disease burden was due to NCDs in Ukraine in 2019. Exposure to such risk factors as high blood pressure, dietary risks and tobacco use caused around 54% of total DALYs. Disease burden attributable to alcohol use was at 10%, among the highest in the former Soviet Union.

Fig. 23 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Ukraine, 2019



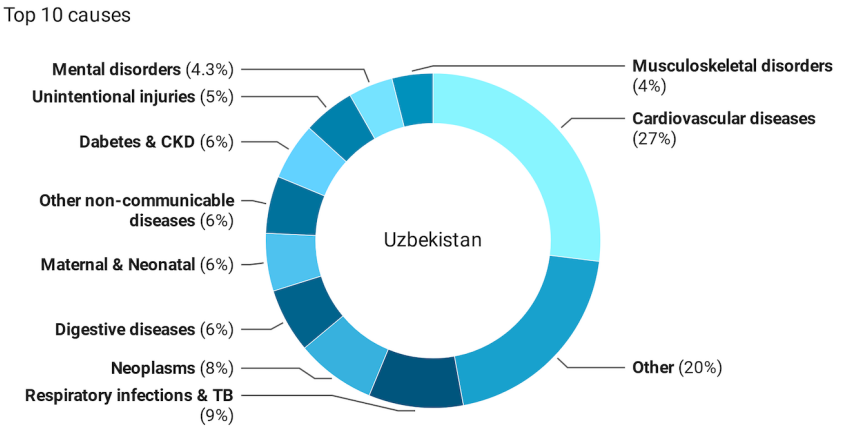
Notes: Ibid.

Source: IHME (2020).

Finally, in Uzbekistan the top causes of disease burden are nearly identical to Turkmenistan though with different percentage contribution as seen from Figure 24. Cardiovascular diseases alone account for nearly 27% of total DALYs followed by respiratory infections and tuberculosis

with around 9% and neoplasms with about 8%. Tobacco use occupies only eighth position in the top leading causes though is still responsible for a considerable share of around 9 % of total disease burden.

Fig. 24 – Breakdown of DALYs due to top 10 causes and top 10 risk factors, Uzbekistan, 2019



Notes: Ibid.

Source: IHME (2020).

To sum up on DALYs, twelve countries of the former Soviet Union have similar profiles with NCDs as the leading causes of morbidity and mortality with the smallest observed share of around 64% in Tajikistan and the highest share of nearly 85% in Armenia. Second leading group of causes are injuries apart from Azerbaijan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan where second leading group of causes of DALYs are communicable diseases. Such risk factors as high blood pressure, tobacco, dietary risks and high body-mass index are the leading drivers of disease burden in the countries of the former Soviet Union. Alcohol use and malnutrition are also responsible for considerable share of total DALYs. On the one side of the coin, in order to promote the reduction of disease burden and increase of healthy life expectancy, it is imperative to reduce the exposure of population in those countries to the leading risk factors that affect health. On the other side, increasing prevalence of NCDs in the context of population ageing requires effective planning and transformation of health and long-term as well as palliative care. In 2019, older population aged 70 and over bore 33.3% of total DALYs in Georgia, the highest proportion among twelve countries. It was closely followed by Belarus with 29.8%, Armenia with 29.1%, Ukraine with 28.6%, Russia with 26.2% and Moldova with 26.0%. The lowest share of total disease burden borne by older population aged 70 and over was observed in Central Asian countries including Tajikistan with 9.1%, Uzbekistan – 10.2%, Turkmenistan – 11.7% and Kyrgyzstan with 13.0% (IHME 2020). These proportions are in line with the lowest OADR observed in those four countries as examined in Section 7.2.1. However, the analysis results of Section 7.3.1 indicated that Central Asian countries are expected to experience accelerating pace of population ageing which would result in the considerable increase in the share of total disease burden borne by older population.

Another way to measure the health status of a population is through subjective assessment, that is, self-rated health. A number of studies have reported that older individuals tended to over-

estimate or, on the contrary, under-estimate their health (Wu et al. 2013). Self-rated health analysis was not included in this study due to the debatable consistency of subjective health with objective health along with the lack of recent data for all twelve countries studied in this research.

Progress in health care services can be measured through such important factors as access to care, quality of care and health care resources (human, physical and financial). Public health performance measurement at a country level requires monitoring the inputs (i.e., resources and capacity), outputs (i.e., services) and outcomes through systematic approach (Turnock and Handler 1997).

Access to care for older population on a country level can be analysed through availability and quality of palliative and long-term care. Palliative care originated as the end of life care of patients with cancer that was traditionally more accessible for younger people compared to older people; today, it includes the care pathways of a number of various life-threatening diseases and has become a matter of growing importance in public health to meet the needs of older people in the context of changing pattern of disease (Davies and Higginson 2004a; O'Brien 2013; WHO 2020c). Research evidence suggests that between 50% and 70% of people who are receiving care for some sort of serious illness are in favour of home care at the end of life though despite this preference death in hospital prevails in many Western countries (Davies and Higginson 2004b). In most of the countries studied in this research, palliative care is not yet developed due to lack of adopted strategies on a state level in some countries and adequate funding in the others. This is also due to traditional setting persisting in those countries where older people and patients in need of palliative care are generally cared for by family members at home. Below is the limited data available at a country level:

- Armenia: Health Systems in Transition review on Armenia published in 2013 reported that there were no specialized palliative care units in the country (Richardson 2013). The situation has developed positively since, and in 2016-2017 the Government of Armenia approved the National Strategies on Palliative Care and Action Plans (Papikyan, Connor and Amiryan 2018).
- Azerbaijan: According to Health Systems in Transition review on Azerbaijan published in 2010, palliative care was not developed neither in terms of human health care resources nor specialized facilities (Ibrahimov et al. 2010). No recent official publication has been found on any developments of palliative care in the country.
- Belarus: There are 15 hospices and regional palliative care departments providing medical and psychological support to patients with life-threating illnesses (Mychko and Svetlovich 2018). Older population receives palliative medico-social care mostly through visiting nurses service as it aims to help older people remain independent and stay at home as long as possible.
- Georgia: State budget for palliative care is limited and adult palliative care provided through home care and inpatient service facilities is not sufficient to meet the need, especially in rural areas (Kiknadze and Dzotsenidze 2018).
- Kazakhstan: There are 13 institutions including hospices, nursing centers and palliative care departments offering palliative care which mostly address the needs of patients

suffering from cancer. Patients living in remote rural areas do not have the access to existing facilities. (Kunirova and Shakenova 2018).

- Kyrgyzstan: There is no well-established system and in the majority of cases palliative care is provided though home-based visits from primary health care facilities (Ibraimova et al. 2011) The only palliative care departments located at the National Cancer Center do not meet the needs of population needing palliative care annually (Mukambetov et al. 2018).
- Moldova: There are around 740 persons per 100 000 population in need of palliative care annually (Gherman et al. 2018). There are no specialized palliative care facilities and the service addressed to adults is provided through home palliative care teams (Atun et al. 2008).
- Russia: The development began in 2011 with incorporation of palliative care into legislation and creation of the roadmap (WHO 2017b). A new action plan on palliative care has been adopted by the government in 2020 aimed at development of both physical and human resources in the field (Ministerstvo Zdravookhraneniya Rossiyskoy Federatsii 2020).
- Tajikistan: The Group of Assistance in the Development of Palliative Care in Tajikistan was organized in 2004 (Khodjamurodov and Rechel 2010). The first palliative care needs governmental assessment was performed in 2006 which resulted in the establishment of palliative day care centers with mobile care teams and inpatient unit in Dushanbe since 2012 (Abidjanova 2018). There is an evident lack of human and physical palliative care resources in the country.
- Turkmenistan: Palliative care system is not established, there are neither inpatient facilities nor trained palliative care providers though awareness about the need does exist at a state level (Farrington et al. 2019).
- Ukraine: In an effort to raise awareness of the need for palliative care, the first palliative care association was created in 2006 (Lekhan et al. 2015). In 2018, there were seven hospices, 50 inpatient palliative care units and five mobile teams which cover only approximately 25% of the total need. Palliative care is not integrated into public health system and there is an absence of national strategy on organization and implementation of this type of care. (Tymoshevska 2018)
- Uzbekistan: In 2015, the Ministry of Health issued a decree on organizing palliative care within measures on improving medical care to older population. Special units of palliative care are planned to be opened in each regional center around the country. (Ministry of Health of the Republic of Uzbekistan 2015)

Based on the analysed data, it can be concluded that most of the countries of the former Soviet Union view palliative care only from the perspective of providing care to patients suffering from last stages of cancer. According to WHO estimates, the biggest proportion of people – 69% – in need of palliative care around the world are over 60 years old (Connor 2014). With accelerating ageing processes the demand for palliative care is going to only grow. Development of good quality palliative care in the former Soviet Union countries studied here requires clear national

strategy with monitoring system, financial resources, adequately equipped facilities and trained health-care professionals.

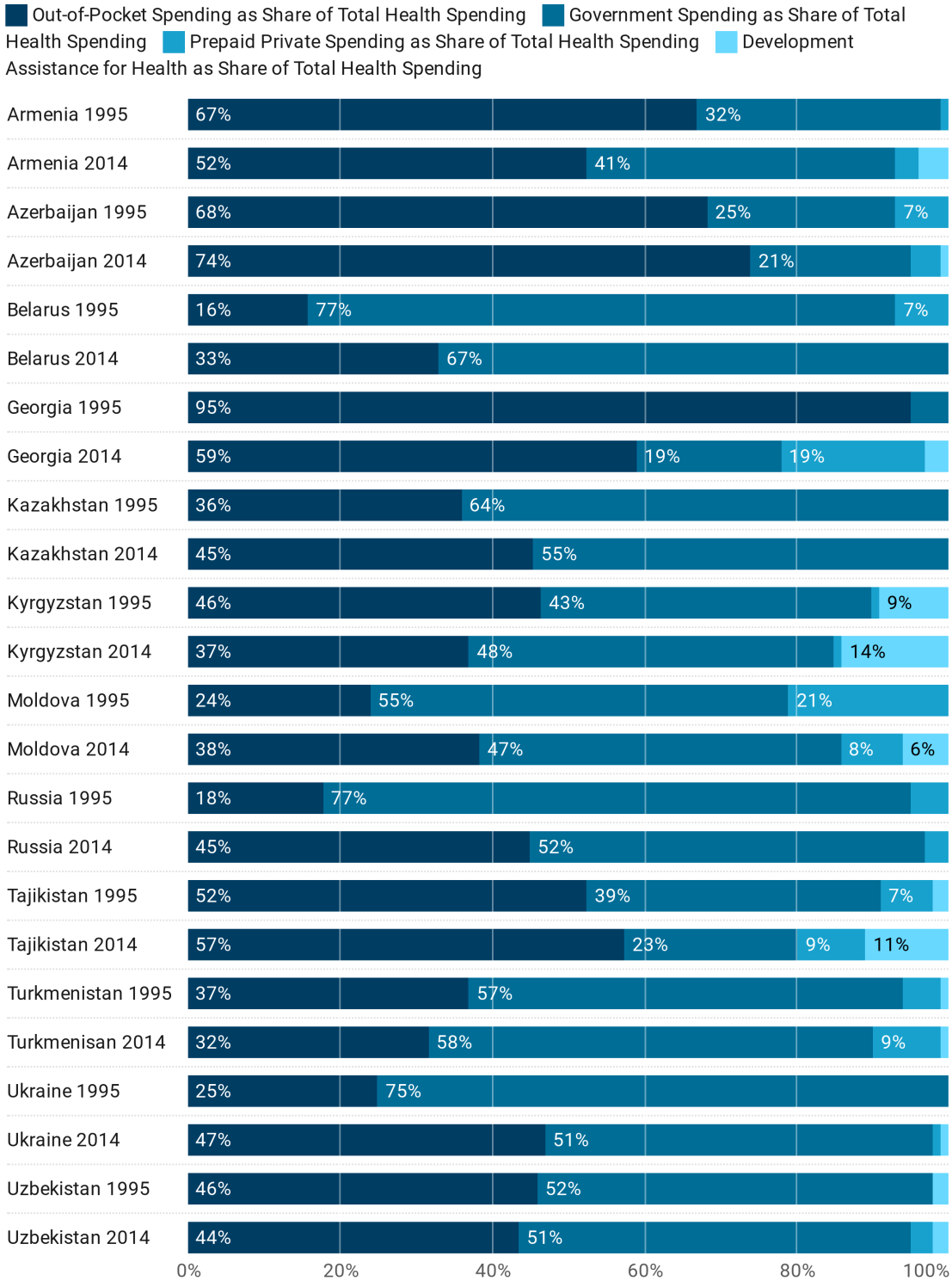
Availability of long-term care is scarce in those countries since elderly people have traditionally been cared for by the family members in home setting (Ahmedov et al. 2014; Atun et al. 2008; Ibrahimov et al. 2010; Richardson 2013). There is a limited number of public nursing and elderly home beds and virtually no private long-term institutions for older population.

While sufficient human and financial health care resources are crucial when it comes to effective functioning of health systems, the question of optimal numbers remains subjective as more resources do not automatically lead to better outcomes. WHO Health Financing Working Paper published in 2016 analysed international health expenditure targets which ranged between 4% and 6% as a share of GDP; based on data envelopment analysis it also compared health care service coverage and financial protection in relation to the level of per capita public spending on health and concluded that although the amount of public spending did matter, there was a notable variation in progress of translating higher public health spending into financial protection for the society (Jowett et al. 2016). United States, for instance, spends like no other country on health care – 16.9% of its GDP while in Czechia health spending does not exceed 7.5% (OECD 2019a). It is the effective roadmaps and consistent monitoring that yields effective results while the numbers provide resource availability. Among the former Soviet Union, Armenia spent over 10% of its GDP on health in 2017 which more than doubled compared to 2010 (WHO 2020a; World Bank 2020). In all of the countries the share of health spending has increased during 2000–2017 apart from Turkmenistan where it remained at the same level of about 6.9% and Kazakhstan, where it decreased from 4.2% to 3.1%. Overall, former Soviet Union countries spend 5%–8% of GDP on public health.

Figure 25 displays the extent of health care coverage through the share of expenditures covered under government spending, prepaid private spending, out-of-pocket spending and international development assistance for health comparing the situation during 1995 to 2014 (the choice of years is based on the earliest and latest available data). Government health spending differs significantly between the countries of the former Soviet Union. Some countries have experienced the increase in state coverage between 1995 and 2014 while in other countries the share has remained about the same or even decreased considerably like in Belarus, Kazakhstan, Moldova, Russia, Tajikistan and Ukraine. Georgia had the smallest share of government spending on health care with a mere 19% in 2014 followed by Azerbaijan with 21% compared to the biggest share of 67% in Belarus. Unlike in MDCs, where government spending coupled with compulsory prepaid private spending cover nearly 75% of total health care costs (OECD 2019a), in countries of the former Soviet Union out-of-pocket spending constitutes a considerable share exceeding half of the total health coverage scheme in some of the countries. In 2014, the highest out-of-pocket spending was observed in Azerbaijan, Georgia, Tajikistan and Armenia which constituted more than half of national spending on health. In Georgia, the share has considerably decreased compared to 1994 when households had to cover around 95% of health care costs out of pocket. When the burden of out-of-pocket healthcare spending is large like in the countries above, people

and, older population in particular, experience significant financial hardship which is more aggravated by increasing incidence of required long-term treatment of NCDs.

Fig. 25 – National health spending by source of funding in post-Soviet countries, 1995, 2014 (%)



Note: The choice of years is based on the earliest and latest available data.

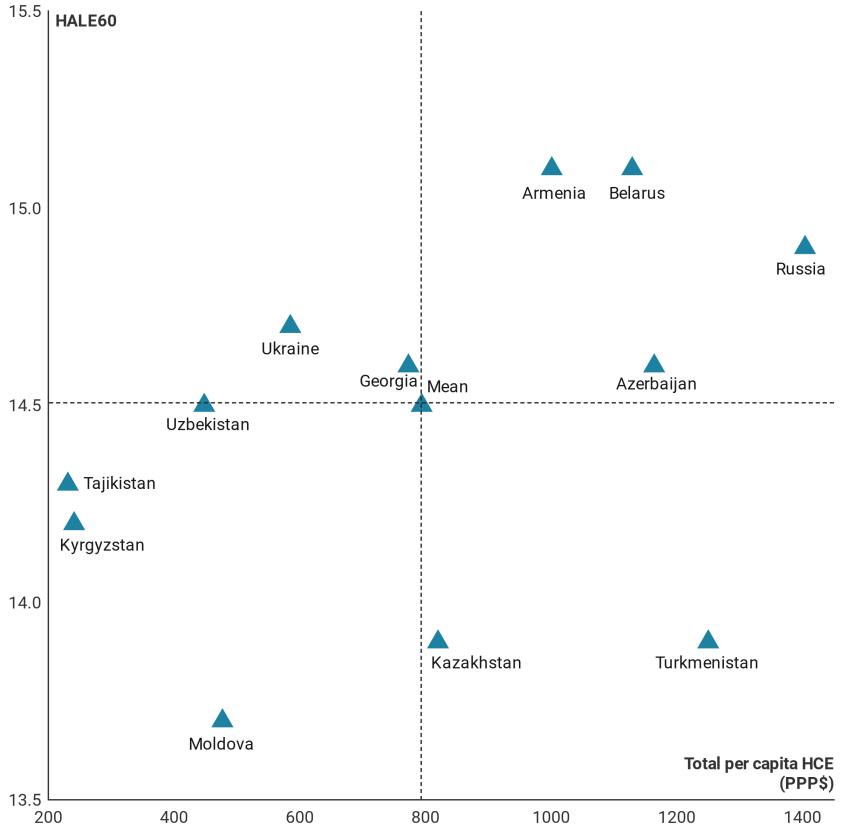
Source: IHME (2017).

Per-capita health care expenditure (HCE) by age-groups data exists only for few countries (Jacobzone and Oxley 2002). It does not exist for the countries studied in this research. Though demographic effect is not the main driver of HCE growth (de la Maisonneuve and Martins 2013), in the context of the accelerating ageing processes it is beneficial to understand the distribution of per-capita HCE by age and their projections for effective policy action. In this regard, de la Maisonneuve and Martins (2013) analysed the available data and projected trends for OECD countries which showed that while 60% of HCE were addressed to individuals below 65 years old in 2010, the trend is expected to reverse and by 2060 that same percentage will be directed to older population aged 65 and over mirroring the increase of older population proportion from 15% to 30%. Increasing number of studies argue that time to death has more significant effects on HCE compared to ageing (Howdon and Rice 2018; Seshamani and Gray 2004; Yang, Norton and Stearns 2003). Strictly speaking, HCE is driven not by ageing but rather by proximity to death since mortality rates are higher for older people though it is true if increase in life expectancy is followed by equivalent rise in healthy life expectancy (de la Maisonneuve and Martins 2013). This is not the case for all of the twelve countries of the former Soviet Union since based on the above analysis the increase in LE60 is not always accompanied by the proportionate increase in HALE60. Another important indicator is the share of out-of-pocket spending of total HCE. WHO (2020a) and World Bank (2020) provide only total private households' out-of-pocket spending on health while in the framework of this research, data by age groups is required for relevant analysis of older people's spending on health care.

Since higher level of HCE does not necessarily predict the efficient use of health resources it is possible to analyse the association of health spending and health outcomes (remaining healthy life expectancy at age 60), human health resources (number of physicians and nurses per 100 000 population), and coverage of essential health services (Universal Health Coverage (UHC) index of service coverage) through quadrant charts. The midpoints of quadrant charts illustrated in Figures 26–28 are the statistical means of the twelve studied countries.

Figure 26 demonstrates the correlation between HALE60 and total per capita HCE (PPP$) in the countries of the former Soviet Union. There is a positive association between healthy life expectancy and per capita health expenditure in four countries including Armenia, Azerbaijan, Belarus and Russia where higher spending translates into higher healthy life expectancy among older population. Ukraine, Georgia and Uzbekistan spend less on public health whereas older people there are still expected to have the group average or longer remaining healthy years of life. In Moldova, Kyrgyzstan and Tajikistan lower health spending directly correlates with lower healthy life expectancy among older population. Meanwhile, in Kazakhstan and Turkmenistan health expenditure is negatively correlated with HALE60 indicating that higher spending does not contribute to better health outcomes and health systems in those countries require special policy attention.

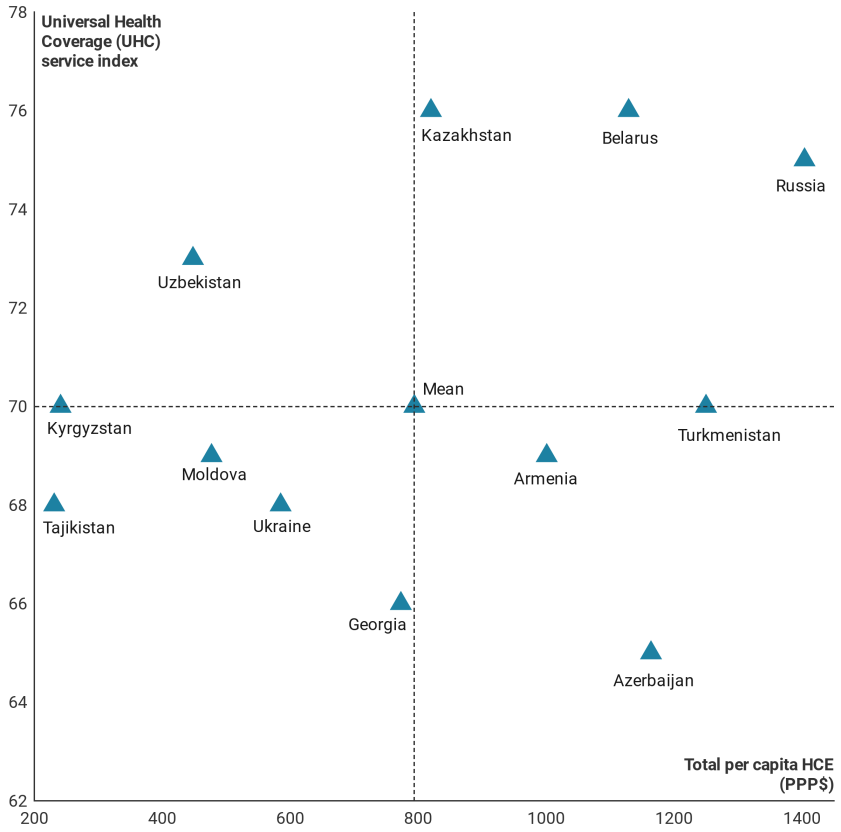
Fig. 26 – Association of healthy life expectancy and health expenditure in post-Soviet countries, latest available year



Source: WHO (2017a); WHO (2020b).

UHC service coverage index approximates health services coverage through 14 tracer indicators from four essential health service domains including NCDs, infectious diseases, reproductive, maternal, infant and child health, and service capacity and access (WHO 2019). Figure 27 shows that higher health spending is positively correlated with higher essential service coverage in Belarus, Kazakhstan and Russia meaning that these nations are more likely to have a better distribution of access to health care. Uzbekistan has achieved sizable progress in the coverage of essential health services even with lower per capita spending. Kyrgyzstan and Turkmenistan have the group average level of health service coverage though it is achieved with different levels of spending where Kyrgyzstan has second lowest per capita health spending and Turkmenistan, on the opposite, second largest per capita spending among the countries of the former Soviet Union. In Georgia, Moldova, Tajikistan and Ukraine, health care spending is negatively correlated with essential health service coverage since lower spending results in lower coverage. Those countries need to potentially reconsider their health spending strategies and health service models to address the challenges and optimize the performance of health care in the context of accelerating population ageing process. The level of essential health service coverage in Armenia and Azerbaijan is lower than the group average though per capita health expenditures are considerably high which leads to the questioning of the effectiveness of financial health resources distribution.

Fig. 27 – Association of essential health services coverage and health expenditure in post-Soviet countries, latest available year

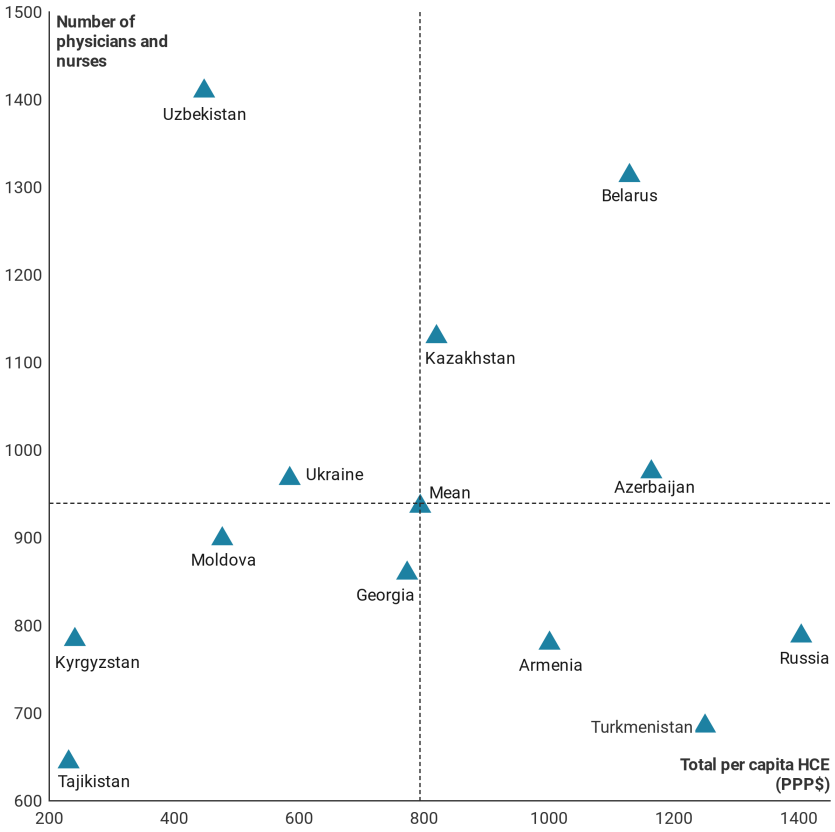


Source: WHO (2017a), WHO (2020b).

The quadrants in Figure 28 illustrate week correlation between the density of physicians/nurses and spending in the studied countries apart from Azerbaijan, Belarus, and Kazakhstan where higher spending translates into higher number of physicians/nurses per 100 000 population and Georgia, Kyrgyzstan, Moldova and Tajikistan where lower per capita spending is associated with lower density of health care providers. Traditionally labour-intensive health care sector will most likely require even higher number of health providers and personnel with increasing older population in relative and absolute terms coupled with increasing incidence of chronic illnesses. The decreasing ratio of workers to retirees would aggravate the human health resources shortage unless the policy makers identify and mitigate the risks through clearly defined strategies and monitoring systems.

The analysis of the health care services and health outcomes in the countries of the former Soviet Union has revealed a number of challenges and risks associated with population ageing process. The studied countries are experiencing the third stage of revisited epidemiological transition, i.e. the stage of triple health burden where the new set of NCDs has added to the persisting old set of health problems of malnutrition, maternal mortality and communicable diseases along with lagging health care services.

Fig. 28 – Association of the number of physicians and nurses and health expenditure in post-Soviet countries, latest available year



Source: WHO (2017a), WHO (2020b).

Policy action taken today can help to ensure a better health, an efficient access and adequate quality of health care for older population and the population at large. Detailed structured list of challenges and risks associated with public health sector in the twelve countries of the former Soviet Union is provided in Section 9.2.1 within gap analysis.

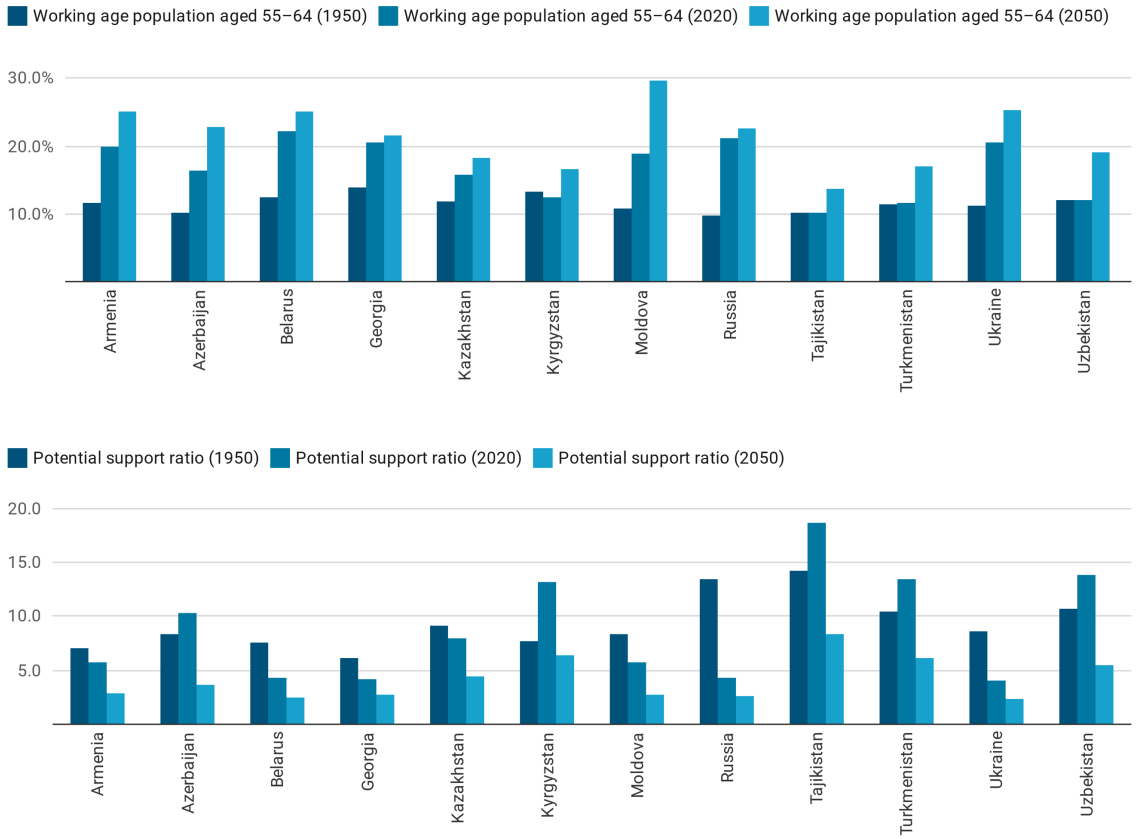
8.1.2 Employment and social protection

The process of population ageing is likewise associated with the ageing of the workforce. According to United Nations (2019b) medium fertility projections, profound changes are expected not only in the size but also the age structure of the working-age population worldwide and in the countries of the former Soviet Union in particular. Empirical research findings suggest that, among other things, the changes in the age structure of the workforce can potentially influence unemployment rates, age-specific as well as aggregate employment rates, and relative wages (Dixon 2003).

Age-structural shifts in the workforce from comparatively young to comparatively old workers result in the so-called "workforce ageing" phenomenon (Aiyar, Ebeke and Shao 2016). The share of the 55–64 years old age group in the overall working-age population has increased substantially during the last seven decades in eight post-Soviet countries (Fig. 29). As seen from Figure 29, the highest increase has been observed in Russia where the share has more than doubled

from around 9.7% to 21.2%, closely followed by Belarus with nearly 10 percentage points increase and Ukraine with around 9 percentage point increase. Central Asian countries apart from Kazakhstan have not experienced the rise in the share of 55–64 years old in the total workforce. This is mainly due to the substantial increase of fertility rates observed during the 1960–1970s in these countries that preceded the onset of fertility transition. Though, according to the United Nations (2019b) medium fertility projections, the share is expected to increase significantly during the coming three decades in those Central Asian countries. It is estimated that Moldova should experience the biggest rise among European countries where the proportion of individuals aged 55–64 in the overall share of working-age population is to reach nearly 30% by 2050.

Fig. 29 – Workforce ageing (% of working-age population aged 55–64) and potential support ratio (age 15–64 / age 65+) in post-Soviet countries, 1950, 2020, 2050



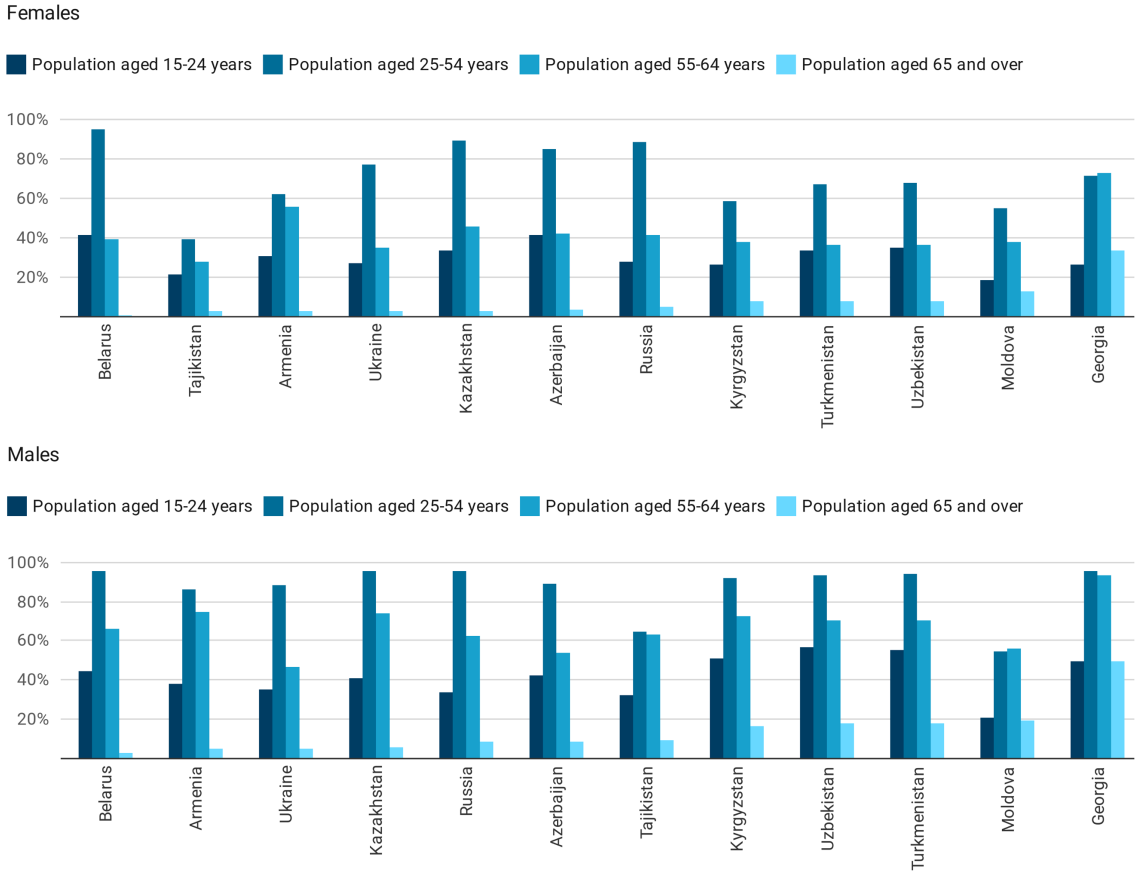
Source: United Nations (2019b) and author's calculations.

Concurrently, population ageing results in the decreasing potential support ratio (PSR) expressed as the ratio of working-age population aged 15–64 per older individual aged 65 and over. The ratio is referred to as "old-age support ratio" by some of the authors. According to Coleman (2002) estimates, before the twentieth century PSR was at 10:1 ratio which has decreased to current 4:1 ratio in most developed countries and is expected to decline even further stabilizing at around 2 and 3 throughout the world in case of no major changes in fertility and mortality rates in the long-run future. Figure 29 illustrates the recent developments and expected changes in the PSR among the studied countries of the former Soviet Union. In line with workforce ageing, European countries along with Armenia and Georgia had the lowest PSR

ranging between 4 and 6 in 2020. The highest PSR of 18.7 in 2020 was observed in Tajikistan. The projected trend shows that PSR is estimated to decline substantially towards mid-century in all of the studied countries of the Soviet Union without exception. Within the next three decades the steepest drop of more than 60% in PSR is expected in Azerbaijan and Uzbekistan closely followed by the rest of the Central Asian countries. The changes in the structure of the working-age population and PSR are closely related to the trend in the quantum and tempo of population ageing processes in the studied post-Soviet countries analysed earlier in Sub-chapter 7.3.

Changes in the workforce age-structure in the context of the ageing process lead to increasing median age of labour force. Worldwide, the median age of working individuals is set to augment from current 39.0 years to 40.6 years by 2030 (ILO 2020). This seemingly modest increase may lead to a number of reverberations in the labour market. Older workers are generally less likely to be unemployed compared to younger workers, however, once unemployed, the probability of returning back to employment within a short period of time is considerably lower which creates the potential discouragement and leads to older workers' decisions to leave the labour market (Kuhn, Milasi and Yoon 2018). This in turn effects the LFPR among older workers. According to D'Addio, Keese and Whitehouse (2010), LFPR of older workers has increased during 1970–2008 in most OECD countries, albeit, most workers exit the labour market before the statutory retirement age.

Fig. 30 – Labour force participation rates (LFPR) by age and sex, post-Soviet countries, 2020



Note: Sorted in ascending order by age group 65 and over.

Source: ILO (2020).

Figure 30 demonstrates the LFPR by aggregate age groups and sex recorded in 2020 in the post-Soviet countries. The highest LFPR among older individuals were observed in Georgia where 33% of females and nearly 50% of males aged 65 and over were still working in 2020. The highest median age of labour force was also observed in Georgia in 2020 with 48 years and 43.2 years among females and males accordingly (ILO 2020). In Belarus, in contrast, the LFPR among older workers is very low – only 1% of females aged 65 and over and around 3% of males aged 65 and over remain in active employment. However, the median age of labour force here is not the lowest among the studied post-Soviet states and is nearly the same for both males and females at approximately 40–41 years (ILO 2020). Overall, apart from Georgia and Moldova, the LFPR among older people aged 65 and over both for females and males are lower than 10%. Such low rates can be explained by the lower statutory retirement age in the studied countries compared to MDCs (ISSA 2018a, 2018b).

Tab. 7 – Statutory retirement age in post-Soviet countries, 2020

	Female	Male
Armenia	63	63
Azerbaijan	60.5 (rising by six months a year until reaching the age of 65 in July 2027)	63.5 (gradually rising by six months a year until reaching the age of 65 in July 2021)
Belarus	57 (gradually rising by six months a year until reaching the age of 58 by 2022)	62 (gradually rising by six months a year until reaching the age of 63 by 2022)
Georgia	60	65
Kazakhstan	59.5 (gradually rising by six months until reaching the age of 63 by 2027)	63
Kyrgyzstan	58	63
Moldova	59 (gradually rising by six months until reaching the age of 63 by 2028)	63
Russia	56.5 (gradually rising to age 60 by 2028)	61.5 (gradually rising to age 65 by 2028)
Tajikistan	58	63
Turkmenistan	57	62
Ukraine	59.5 (gradually rising to age 60 by 2021)	60
Uzbekistan	55	60

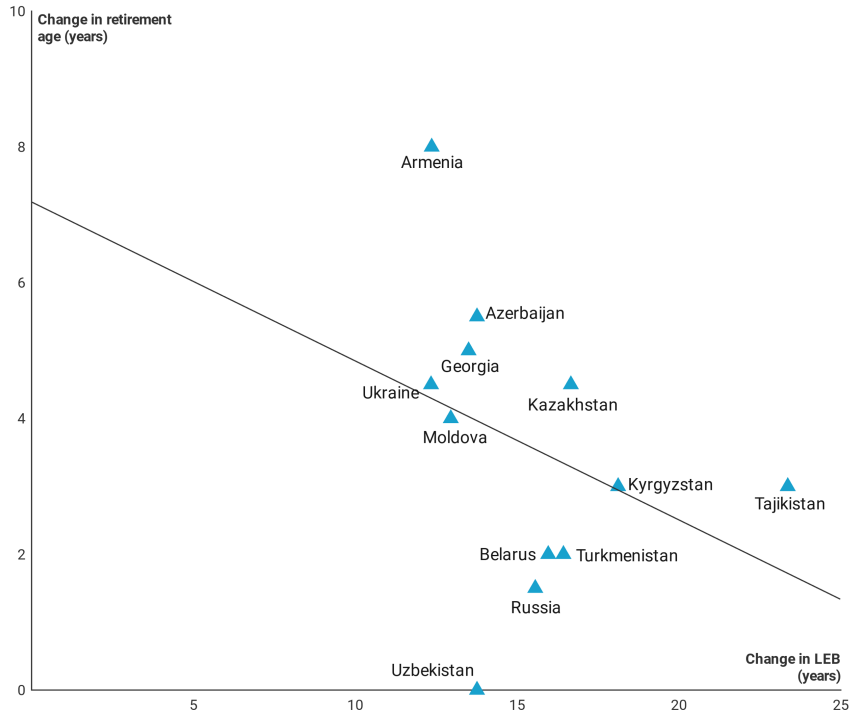
Source: Elektronnoye pravitel'stvo Respubliki Kazakhstan (2020), ISSA (2018a; 2018b), Ministerstvo Truda i Sotsial'noy Zashchity Naseleniya Azerbaydzhanskoy Respubliki (2016), Ministerstvo Truda i Sotsial'noy Zashchity Respubliki Belarus' (2020), Pensionnyy fond Rossii (2020).

Average retirement age in the post-Soviet states is 58.6 years for females and 62.4 years for males (Tab. 7). Consequently, unlike in most of the existing research, in case of the former Soviet Union countries it is more rational to look at the LFPR of older individuals aged 55–64 rather than at the age group of 65 and over. As seen from Figure 31, among individuals aged 55–64 the highest LFPR are once again observed in Georgia with 72% for females and 94% for males while in Ukraine the rates are the lowest at 35% and 47% for females and males respectively. In general, among post-Soviet countries, approximately 46% of females aged 55–64 remain working while

among the males the rate is around 67%. This indicates that on average more than half of females and one third of males in post-Soviet states leave the labour market before the standard retirement age.

The studied countries are substantially heterogenous in terms of total LFPR among females ranging from a mere 31% in Tajikistan to 63% in Azerbaijan (ILO 2020). Compared to other countries of the former Soviet Union, total LFPR in Moldova is very low both among females and males with around 40% and 46% respectively. The root causes behind this trend in Moldova are large emigration flows and low educational attainment among both older and younger workers (Davalos et al. 2017).

Fig. 31 – Change in life expectancy at birth (LEB) vs change in statutory retirement age in post-Soviet countries, females, 1950–2020

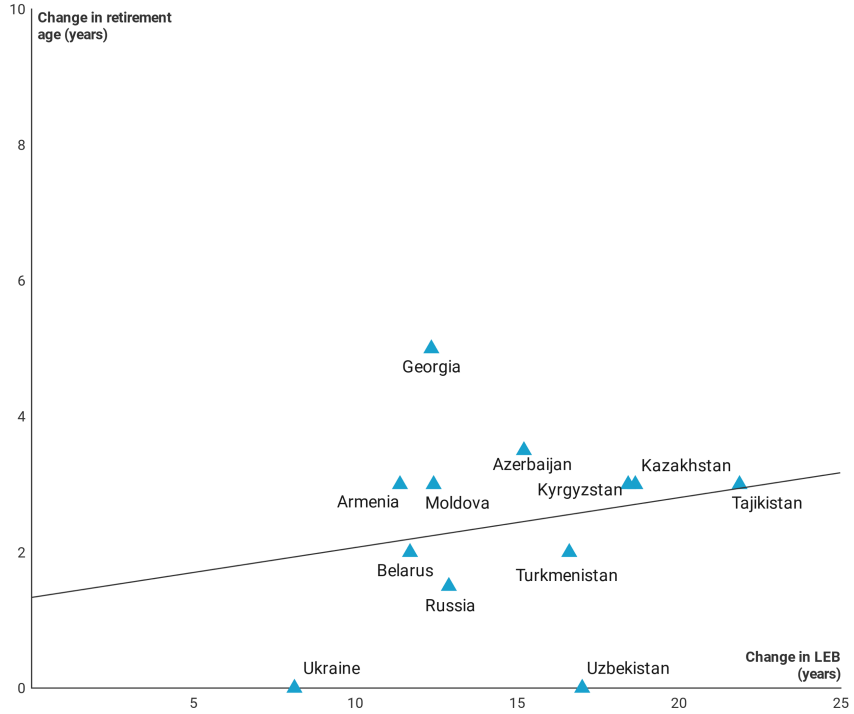


Source: Elektronnoye pravitel'stvo Respubliki Kazakhstan (2020), ISSA (2018a; 2018b), Kapustina (2008), Ministerstvo Truda i Sotsial'noy Zashchity Naseleniya Azerbaydzhanskoy Respubliki (2016), Ministerstvo Truda i Sotsial'noy Zashchity Respubliki Belarus' (2020), Pensionnyy fond Rossii (2020), United Nations (2019b).

Statutory retirement ages in the post-Soviet states are comparatively low, especially for females (Tab. 7). OECD average, for instance, was at 64.2 years for males and 63.5 years for females in 2018 (OECD 2019b). Besides, among the twelve studied countries, equal retirement age for males and females was observed only in Armenia at 63 years in 2020. Kazakhstan, Moldova and Ukraine, however, have started to gradually raise the eligibility ages for social security pensions among females. While, Azerbaijan, Belarus and Russia will gradually increase the retirement ages for both females and males over the next years until reaching the age of 63 years in Belarus and 65 years in Azerbaijan and Ukraine. Having the lowest statutory retirement ages, especially among females, Central Asian governments are not, as yet, seeking to raise the

retirement ages. In Uzbekistan, for example, the statutory retirement ages of 55 years for females and 60 years for males have remained the same for the last six decades since 1956 (Kapustina 2008), though, the LEB has increased by 13.8 years (from 59.9 to 73.6 years) for females and 17.0 years (from 52.4 to 69.4 years) for males during this period (United Nations 2019b). Interestingly enough though, back in 1955 the male statutory retirement age was higher than LEB observed among males in nearly all of the countries of the Soviet Union apart from Armenia, Belarus and Ukraine where LEB exceeded the retirement age by mere 2, 3 and 4 years respectively.

Fig. 32 – Change in life expectancy at birth (LEB) vs change in statutory retirement age in post-Soviet countries, males, 1950–2020



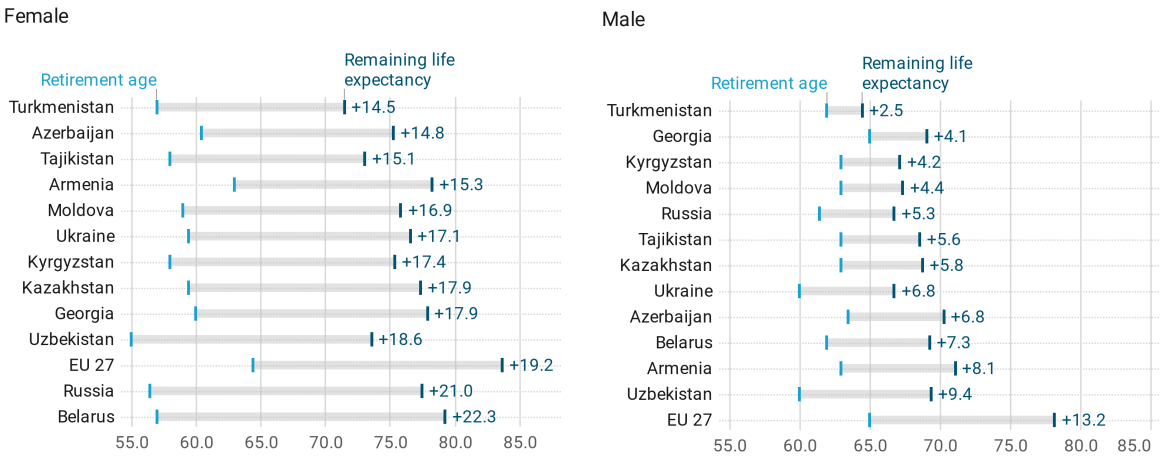
Source: Elektronnoye pravitel'stvo Respubliki Kazakhstan (2020), ISSA (2018a; 2018b), Kapustina (2008), Ministerstvo Truda i Sotsial'noy Zashchity Naseleniya Azerbaydzhanskoy Respubliki (2016), Ministerstvo Truda i Sotsial'noy Zashchity Respubliki Belarus' (2020), Pensionnyy fond Rossii (2020), United Nations (2019b).

Figures 31–32 show that there is no correlation between the observed change in LEB and change in statutory retirement age during 1950–2020 in most of the studied post-Soviet countries. The increase of LEB by around 12.4 years among females in Armenia has indeed been followed by the highest observed augmentation of statutory retirement age by 8.0 years among the twelve countries (Figure 31). In Azerbaijan, Georgia, Moldova, Kazakhstan, and Ukraine the increase in LEB between 12.3 and 16.7 years among females has been followed by an increase in retirement age between 4.0 and 5.5 years. For Tajik females who have experienced the highest gain in LEB of 23.4 years during 1950–2020 the statutory retirement age has been raised by 3.0 years. Having experienced the lowest gain in LEB of 8.1 years, Ukrainian males have not had their retirement age raised during the last seven decades. In Russia, the increase of 12.9 years in LEB among

males has been accompanied by only 1.5 years of increase in statutory retirement age during the same period (Fig. 32). The highest increase in retirement age among males has been observed in Georgia along with a 12.4-year gain in LEB.

Empirical research suggests that raising the statutory retirement age is an effective policy instrument that could mitigate the potential negative effects of the ageing process on macroeconomic performance (Bloom et al. 2015; Gurvich and Ivanova 2018; Lalive and Staubli 2014). However, the increase in retirement age has to be justified by the corresponding level of life expectancy and health of older population. Figure 33 demonstrates stark differences between males and females in terms of the remaining life expectancy after the observed retirement age. Males in Turkmenistan are expected to live on average only 2.5 years after the statutory retirement while for females the remaining lifespan is considerably higher at around 14.5 years. In Georgia, remaining life expectancy after the statutory retirement among males is one of the lowest among post-Soviet states while among females it is one of the highest, i.e., 4.1 years versus 17.9 years. In Uzbekistan, the remaining life expectancy in question among males at 9.4 years is the highest among the studied countries of the former Soviet Union though Uzbek females are still expected to live nearly twice as long after the retirement. Overall, female life expectancy after the statutory retirement in post-Soviet countries is comparable to that in the European Union (EU–27). Albeit, among males in the former Soviet Union countries the average remaining life expectancy is more than twice as low compared to males in EU–27.

Fig. 33 – Remaining life expectancy after retirement in post-Soviet countries and EU–27 by sex, latest available year



Notes: Remaining life expectancy = LEB – retirement age. Sorted in ascending order.

Source: Eurostat (2019), United Nations (2019b) and author's calculations.

A large number of research studies have been dedicated to investigate the sustainability of PAYG pension scheme (where current workforce finances current pensioners) in the context of population ageing (Cipriani 2013). The studied countries of the former Soviet Union have all inherited a one level PAYG pension system (Grishchenko 2016). As seen from Appendix 3, pension systems in the post-Soviet states have undergone the reforms with introduction of the multi-pillar old-age income security programs. Pension system optimization is the key to

sustainable economic development from one side of the coin and elimination of poverty among older population from the other side.

Based on the cases of Belarus and Ukraine, Lisenkova (2011) and Lisenkova and Bornukova (2017) argue that the increase of the statutory retirement age to 65 years for both males and females is the decisive element in avoiding the growing pension fund deficit and ensuring sustainability of pension system in those countries. However, in accordance with mortality trends analysed in this study, the applicability of such policy instrument as mechanical increases in retirement ages in the post-Soviet countries without considering the average life expectancy is questionable.

Considering low LFPR among females and older working-age groups in the countries of the former Soviet Union, the focus should be placed on raising participation rates and promoting labour productivity. The ageing workforce coupled with increasing pace of technological advancement requires targeted efforts of older workers' skills development, specific human resource measures and elimination of age discrimination both at macro- and micro-levels. Using a linked employer-employee dataset from Germany covering the years of 1997–2005, Zwick and Göbel (2013) find that adoption of such measures as mixed-age working teams or provision of specific equipment for work places lead to higher productivity of older workers which, as a result, is on average not lower than the productivity of prime-age workers. Lovász and Rigó (2012), on their turn, based on a linked employer-employee dataset for Hungary covering the period 1986–2008, demonstrate that older workers (highly skilled workers in particular) experience skills obsolescence during technologic and economic change which directly affects their productivity levels. The authors emphasize on the effect of economic change on older workers' human capital and stress on the importance of appropriate policies that are aimed at providing training and continual education for older workers.

Based on this analysis it can be concluded that mechanical sharp increases in statutory retirement age for males in the twelve countries of the former Soviet Union could not be presently justified by the observed mortality trend. Potential gradual augmentation in retirement age should be carried out in accordance with observed and projected life expectancy trends. Apart from appropriate public policies ensuring progress in population health and health services, the studied countries should consider policy instruments aimed towards increasing LFPR among all working-age groups and females as well as older working-age groups in particular, and promoting labour productivity in order to lessen the potential negative consequences of population ageing on labour market and economic well-being. It is important to measure labour productivity and understand the mechanisms standing behind its relationship with workforce age structure as economic growth is not solely a result of labour quantity but also of its quality. Comprehensive list of challenges and risks associated with employment and social protection sectors in the studied post-Soviet states is to follow in Section 9.2.1 within gap analysis.

8.1.3 Ageism

Research indicates that ageism towards older individuals is pervasive throughout the world and is more pronounced in low income countries (Burnes et al. 2019; Officer et al. 2020). The term

"ageism" was first coined by Robert Butler in 1969 as "prejudice by one age group toward other age groups" (Butler 1969, p. 243). The growth of older population both in absolute and relative terms in the context of the ageing process would exacerbate the scope of this problem ubiquitously.

The accelerating quantum and tempo of the ageing process requires tackling the widespread nature of ageism since it leads to not only distortions in labour market but puts older people at risk of having negative physical and mental health outcomes, and experiencing social exclusion (Burnes et al. 2019; Dick 2016). The presence of ageism may also serve as the basis aggravating elder maltreatment. Elder maltreatment is a growing concern being recognized as a social and health issue. Increasing life expectancy that is not accompanied by the proportional increase in healthy life expectancy results in a higher number of years spent in relatively poor health. During those years older people may become more exposed to maltreatment due to higher disability and dependency (WHO 2011). In the studied countries of the former Soviet Union, older females have a much higher risk of exposure to ageist attitudes and elder maltreatment due to pronounced imbalances in sex structure of older population analysed earlier in this research.

Despite the increasing recognition of ageism and elder maltreatment as a major concern across countries, there is a lack of uniform quantitative and qualitative measurement tools which could help to identify the prevalence of the problem. Longitudinal data would then allow identifying the trends of changing (or not) attitudes over time. Having conducted a comprehensive research on existing literature that identify ageism measurement tools, Wilson, Errasti-Ibarrondo and Low (2019) found only 25 tools, out of which only six had actually been used to estimate the prevalence of ageism though based on small non-representative samples. The authors emphasized the existence of a sizable knowledge gap and stressed on the importance of measurement tools development and usage of population-representative polling or censuses to analyse both the extent and impact of ageism.

To the best of our knowledge, the largest recent sample survey that examined, inter alia, ageism throughout the world and included nine of the studied countries of the former Soviet Union was Wave 6 of the World Values Survey. Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Russia, Ukraine and Uzbekistan with a minimum of 1000 participants per country took part in the survey (Inglehart et al. 2014). Ageism related attitudes can be determined from nine questions specified in Appendices 4.1–4.9. Four questions that used a four-point Likert scale ranging from one (strongly agree) to four (strongly disagree) asked whether "older people are not respected much these days", "older people get more than their share from the government", "older people are a burden to society" and "companies that employ young people perform better than those that employ people of different ages". Based on the average results for those four questions it can be concluded that the highest prevalence of ageist attitudes was observed in Kyrgyzstan and the lowest one in Uzbekistan. This survey does not include a fixed set of questions through its Waves so it is not possible to carry out a longitudinal analysis of ageist attitudes in participating countries.

The first step in solving the problem of ageism and elder maltreatment is evaluation of the extent and causes through establishment of unified frameworks. This should be followed by

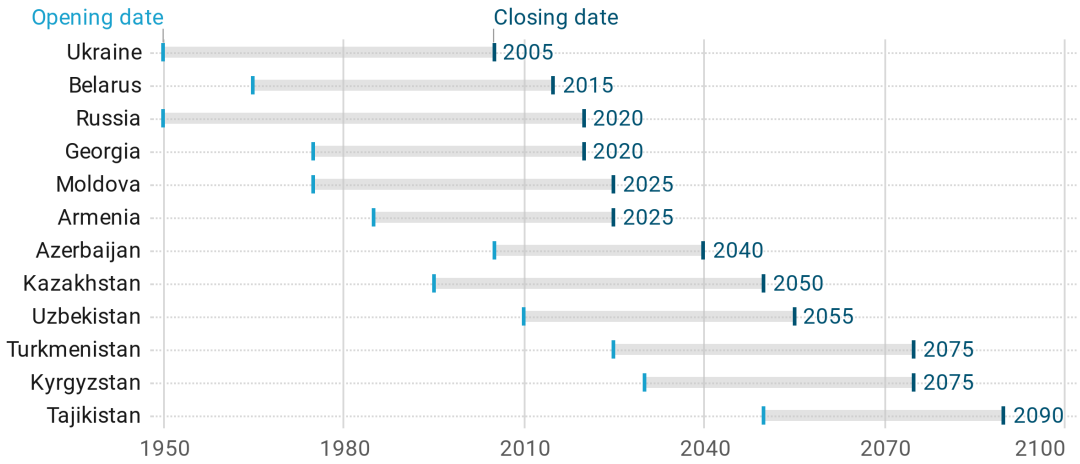
raising awareness and implementing prevention programs to strengthen solidarity across generations. Last but not least, policy makers can benefit from established information systems and adopt multi-faceted approach in combating the problem. As a guiding international policy instrument in response to ageing, MIPAA acknowledges the need to combating ageism and highlighting the positive aspects of population ageing (United Nations 2002). This international policy instrument could serve as the foundation in the direction of identifying and addressing the issue at the state level in post-Soviet countries. Universal legally binding instrument explicitly stipulating the human rights of older people, however, does not exist to this day.

The results of the analysis carried out in this Sub-chapter confirm the hypothesis III demonstrating that the pace of demographic changes is positively correlated with the extent of population ageing related challenges in health and social sectors in the studied countries.

8.2 Ageing as an opportunity: Demographic window of opportunity and demographic dividends

A demographic window of opportunity is the outcome of demographic revolution. It is a period offering a unique opportunity for economic development, when decreasing TFR results in shrinking proportion of young population (aged under 15 years) and growing proportion of working-age population (aged 15–64 years) while the share of older population (aged 65 and over) is still small (van der Ven and Smits 2011). Significance of the demographic window phenomenon depends on the type of demographic transition process and the speed as well as the rate of fertility decline, in particular. As a result, the LDCs that undergo very fast processes of fertility decline have an advantage of experiencing short but a considerable demographic window of opportunity (Vallin 2007).

Fig. 34 – Demographic windows of opportunity in post-Soviet countries



Note: Sorted in ascending order by the closing date of the demographic window of opportunity.

Source: Author's calculations using the data from United Nations (2019b).

As per the UN definition, demographic window of opportunity opens when the share of young population (aged under 15 years) falls below 30% while the proportion of older population (aged 65 and over) is still below 15% (Hakkert 2007). Figure 34 illustrates the lengths of the

demographic windows in the studied post-Soviet countries. Russia and Ukraine are the only countries where the demographic windows of opportunity opened prior 1950, hence due to data unavailability it is not possible to calculate its length. Though, it can be estimated that the window period observed in Russia and Ukraine was the longest among the studied countries of the former Soviet Union and closed in 2005 and 2020 respectively. Having opened in 1965 and 1975, the demographic windows in Belarus and Georgia closed in 2015 and 2020 respectively. Moldova and Armenia have only five more years before their windows of opportunity are expected to close by around 2025. Kazakhstan is expected to experience the longest demographic window of 55 years (1955–2050) among Asian post-Soviet countries. Azerbaijan, in contrast, is to undergo the shortest 35 year-long demographic window of opportunity during 2005–2040. Kyrgyzstan, Tajikistan and Turkmenistan were the countries with the highest observed TFR among the twelve studied countries in 2020, and demographic windows here are estimated to open only in 2030, 2050 and 2025 respectively and are expected to last between 40 and 50 years.

The demographic dividend is a transient phenomenon occurring when the window of opportunity remains open (Mason 2003). The demographic dividend, however, is not an automatically occurring phenomenon (Bloom, Canning and Sevilla 2003; Pool 2007) as often assumed by policymakers. It can only be seized through a favourable policy environment. Once the window is closed, the demographic dividend may turn into the demographic burden in the context of population ageing process. Ceteris paribus, demographic burden leads to the decline in economic growth (van der Gaag and de Beer 2015). Asian countries including Hong Kong, Singapore, South Korea and Taiwan, also known as "Asian Tigers", for instance, have successfully implemented timely policy measures seizing the demographic dividend which resulted in a sustained economic growth (Mason 2003). According to the estimates of Bloom, Canning and Sevilla (2003), the demographic dividend has probably accounted for nearly one-third of East Asia's "economic miracle".

Education and health as human capital, labour supply, savings and overall good governance are the most important mechanisms through which the demographic dividend can add to economic growth (Bloom et al. 2015; Gribble and Bremner 2012):

- Investing in education and promoting health may have the most substantial and far-reaching effects for a country in earning a demographic dividend. Smaller families are more likely to invest in better education for their children. Better health is known to have the positive effect on cognitive development.
- As a result, the labour force becomes more prolific stimulating higher earnings and a better living standard. Besides, the mechanical effect of growing working-age population may result in increasing per capita production given that the labour market has been adapted to guarantee sufficient employment level. Declining family size also leads to higher LFPR among females.
- Increasing proportion of working-age population results in the growth of savings which can be used for investments spurring economic growth.
- Good governance is crucial when it comes to attracting foreign investment which leads to creation of new jobs and promotes sustainable economic growth.

According to Lee and Mason (2004, 2006), the second demographic dividend is also possible after the first dividend terminates and the window of opportunity closes. Low fertility coupled with improvements in adult mortality leading to increasing share of older population underline the second demographic dividend. However, the second dividend may occur in the context of population ageing process only with appropriate policy environment in place. The authors argue that unlike the first demographic dividend which is transitory in nature, the second dividend may last indefinitely. After the rapid growth of per capita income during the first dividend, comes a period of income stabilization at a higher level than that observed prior to the window of opportunity. Higher proportion of older working-age population and increasing remaining life expectancy after retirement provides an incentive for asset cumulation which might contribute to economic growth through investments. In addition, increasing ratio of capital to labour would lead to higher productivity. Mason et al. (2017) emphasize that there are many other channels which may affect the economic growth due to its complex nature, hence there exists a number of various factors shaping both demographic dividends.

Customizable projection DemDiv model is a tool that may be used by policymakers to quantify the required changes to be made to seize the demographic dividend (Moreland et al. 2014). Associating population age structure with economic and social indicators, the model allows designing multiple scenarios to demonstrate how a set of appropriate multisectoral policy measures can successfully generate the demographic dividend.

The results show that in six post-Soviet countries including Armenia, Belarus, Georgia, Moldova, Russia and Ukraine, the demographic dividend can no longer be seized since the opportunity windows have already closed or are about to close in the coming five years. Policymakers in Azerbaijan, Kazakhstan and Uzbekistan should act immediately to exploit the demographic dividend since the windows of opportunity here have already opened. The remaining three countries including Kyrgyzstan, Tajikistan and Turkmenistan, where the windows are only about to open in the coming decades, are in the best position to develop appropriate set of policy measures and start acting in advance to reap the full benefits of demographic dividend for sustained economic growth. The demographic dividend may be used to prepare for the inevitable population ageing process and its consequences.

Chapter 9

Population ageing related policies

The dynamics of population ageing and public awareness about the phenomenon varies significantly from one country to another. Raising the awareness at the policymaking level is the first important step which can be achieved through national scientific research. However, without awareness and major concern about population ageing and comprehensive policy action, demographic dividend does not occur automatically when the window of opportunities remains open, as discussed in the previous chapter. Economic decline can be avoided with timely and well-chosen policy instruments. Population ageing brings challenges to virtually all spheres of life at the state, local, and individual level. Since this is an immensely broad-spectrum subject, this study has focused on the four key issues where challenges resulting from population ageing are the most acute: public health, employment, social protection and ageism.

The first part of this chapter focuses on identifying the international policy framework on population ageing, level of state awareness and existing ageing related policy measures implemented in the twelve countries of the former Soviet Union. Correlation of high level of concern about ageing and its consequences at the governmental level and practical policy action is tested. The second part presents the results of gap analysis carried out throughout this empirical research including policy recommendations elaborated on the basis of the identified demographic trends and ensuing challenges in the studied countries. The relationship between quantum and tempo of ageing with the extent of public policy action is tested respectively.

9.1 Current policies responding to population ageing

9.1.1 International policy framework on ageing

The Madrid Plan of Action on Ageing (MIPAA) has been serving as the main international guiding policy instrument on population ageing since 2002. MIPAA was adopted at the Second World Assembly on Ageing to address the challenge of "building a society for all ages" (United Nations 2002).

The aim of MIPAA is to ensure that each person around the world experiences secure and dignified ageing. It calls for implementation of adequate practices and policies across all sectors. More importantly it encourages the states to promote participation of older people in the socio-economic and political spheres through voluntary or income-generating work as well as involvement in the actual adoption and implementation of related policies and strategies (UNECE 2015).

The implementation of MIPAA is based on the four main goals that encourage longer working life enabling older people to work for as long as they choose to; promote social inclusion and non-discrimination of older individuals; safeguard health and independence in older age; and support intergenerational solidarity (United Nations 2018). It should be noted that this international policy framework on population ageing goes beyond an elaborated set of theoretical measures to systematic reviewing of the implementation of the plan of action by the member states. However, the process of implementation and reporting of the member states is not legally binding but voluntary. The progress of implementation of MIPAA has been analysed every five years since the first cycle of MIPAA+5 that took place in 2007. The most recent third cycle of MIPAA+15 was held in 2017. Country reports are expected to provide the results of adopted measures as well as elaboration on issues where no progress has been made so far. Eight countries of the former Soviet Union studied in this research have submitted their reports for the third review cycle. Georgia, Kyrgyzstan, Tajikistan and Turkmenistan were not among them. The synthesis report presented by the United Nations (2017) pointed out that the commitments on promotion of sustainable economic growth in response to ageing phenomenon, encouragement of life-long learning and educational systems adaptations, mainstreaming gender approach, and support of families providing care for older persons and promotion of intergenerational solidarity were among the least acted upon.

MIPAA provides an international foundation on policy action on population ageing, however, each country follows its own specific pathway of demographic change coupled with underlying social, economic, health, political and environmental factors. Hence, elaboration and implementation of policies should be, as proposed in this research, preceded by a rigorous analysis of components of demographic change along with health and socio-economic sectors in order to identify the risks and challenges characteristic to a given population.

9.1.2 Existing ageing related public policies in the studied countries

Population ageing is an unprecedented phenomenon as the humankind has not hitherto experienced analogous episodes. The process of population ageing brings about substantial age- and sex-structural changes which result in potential challenges posed for health care, employment, social security and economic development at large. Albeit, doomsday scenario is largely overstated as effective policy measures can serve to mitigate the challenges. If action is taken far in advance in the LDCs where the window of opportunity has just opened or is about to open, the challenges might alternatively be turned into opportunities for economic development benefiting from the possible demographic dividend. This section presents the analysis of ageing related

public policies and measures currently undertaken in the twelve countries of the former Soviet Union.

UN World Population Policies Database provides biennial worldwide revisions of population policy situation. The 2017 and 2019 revisions focused on abortion laws and international migration policies. Hence, the data analysed in this study is based on the preceding revisions of 2009, 2011, 2013 and 2015.

Tab. 8 – Government views on selected policy variables related to population ageing (directly and indirectly) in the countries of the former Soviet Union, latest available year

	Ageing of the population	Size of the working age population	Life expectancy at birth (LEB)	Noncommunicable diseases (NCDs)
Armenia	Major concern	Major concern	Acceptable	Major concern
Azerbaijan	Minor concern	Minor concern	Unacceptable	Major concern
Belarus	Minor concern	Major concern	Unacceptable	Major concern
Georgia	Major concern	Major concern	Unacceptable	Major concern
Kazakhstan	Major concern	Minor concern	Unacceptable	Major concern
Kyrgyzstan	Minor concern	Major concern	Unacceptable	Major concern
Moldova	Major concern	Major concern	Unacceptable	Major concern
Russia	Major concern	Major concern	Unacceptable	Major concern
Tajikistan	Minor concern	Major concern	Unacceptable	Major concern
Turkmenistan	Minor concern	Minor concern	Unacceptable	Major concern
Ukraine	Major concern	Major concern	Unacceptable	Major concern
Uzbekistan	Minor concern	Major concern	Acceptable	Major concern

Notes: Based on latest available data from UN World Population Policies revisions from 2009, 2011, 2013 and 2015. According to the UN World Population Policies definition:
Level of concern about the ageing of the population – "indicates the extent to which the government is concerned about the growing size of the proportion of older persons in the population and its consequences for health and social welfare provisions."
Level of concern about the size of the working-age population – "indicates the government's level of concern regarding the current size of the working-age population in relation to the domestic labour market or in relation to the size of the dependent populations."
View on life expectancy at birth (LEB) – "indicates whether the government considers the level of the life expectancy at birth in the country to be acceptable."
Level of concern about non-communicable diseases (NCDs) – "indicates the extent to which the government considers the prevalence of non-communicable diseases in the country to be a concern."

Source: United Nations (2015b).

The findings of the government views related to population ageing in the countries of the former Soviet Union presented in Table 8 show that the level of concern about ageing was not uniform. Half of the countries did not consider population ageing to be a matter of major concern. However, with reported minor concern, these countries have adopted one or more measures to address population ageing (Tab. 9). The level of national priority on population ageing issues is not correlated with neither the proportion of older population nor the quantum and tempo of the ageing process in some of the studied countries. Belarus, for instance, being the second oldest

nation among the studied post-Soviet populations did not recognize ageing as a matter of major concern though two ageing related measures including introduction or enhancement of non-contributory old-age pensions and promotion of private savings schemes for retirement were being implemented in 2015. As discussed in the previous chapter, gradual raise in statutory retirement age has been introduced in Belarus in the meantime after the 2015 revision on World Population Policies. In Moldova, on the opposite, the government recognized ageing as a matter of major concern though it did not translate into practical action as none of the measures related to population ageing were introduced at the national level. Tajikistan and Uzbekistan considered ageing to be a minor concern and did not implement any related measures.

Despite the fact that the changes in the size and proportion of working-age population result from the age-structural shifts occurring in the context of population ageing, governments of Belarus, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan did not relate their level of concern about ageing to the level of concern about the size of the working-age population (Tab. 8). Nevertheless, nine out of twelve countries except Azerbaijan, Kazakhstan, and Turkmenistan were concerned about the size of the working-age population. All of the countries implemented measures on family and work balance in the form of maternity and parental leaves, subsidized childcare, flexible working hours, etc. However, some of those measures are related to mitigation of population ageing consequences only indirectly.

Tab. 9 – Measures and policies related to population ageing (directly and indirectly) in the countries of the former Soviet Union, latest available year

	Measures adopted to address population ageing*	Policy on population growth	Policy on fertility level	Measures on family and work balance**
Armenia	1, 2, 4	Raise	Raise	1, 2, 3, 4, 7, 8
Azerbaijan	1, 3	Maintain	Maintain	1, 2, 3, 4, 5, 6, 7, 8
Belarus	3, 4	Raise	Raise	1, 2, 3, 4, 5, 6, 7, 8
Georgia	3	Raise	Raise	1, 2, 3, 4, 5, 7, 8
Kazakhstan	2	Raise	Maintain	1, 3, 4, 5, 7, 8
Kyrgyzstan	4	Maintain	Maintain	1, 2, 3, 4, 5, 6, 7, 8
Moldova	None of these	Raise	Raise	1, 2, 3, 4, 5, 6, 7, 8
Russia	2, 3, 4	Raise	Raise	1, 2, 3, 4, 5, 6, 7, 8
Tajikistan	None of these	Lower	Lower	1, 3, 4, 5, 7, 8
Turkmenistan	2	Maintain	Raise	1, 3, 4, 5, 6, 7, 8
Ukraine	1	Raise	Raise	1, 2, 3, 4, 5, 7, 8
Uzbekistan	None of these	Maintain	Maintain	1, 3, 4, 5, 7, 8

Notes: Ibid.

* Measures adopted to address population ageing in the past five years: For 2015 – 1) raised the minimum retirement age; 2) raised social security contributions of workers; 3) introduced or enhanced non-contributory old-age pensions; 4) promoted private savings schemes for retirement.

** Measures on family and work balance: 1) maternity leave for childbirth with job security (paid or unpaid); 2) paternity leave for childbirth with job security (paid or unpaid); 3) parental leave for childcare at home (paid or unpaid); 4) baby bonus (lump sum payment); 5) child or family allowances; 6) tax credit for dependent children; 7) flexible or part-time work hours for parents; 8) publicly subsidized childcare.

Source: United Nations (2015b).

All of the studied countries apart from Armenia and Uzbekistan considered the level of LEB in the country to be unacceptable (Tab. 8). As analysed in the previous chapters, observed LEB levels in the post-Soviet states are low especially among males as a result of excess adult mortality and stagnation or even contraction of life expectancy after the collapse of the Soviet Union.

As demonstrated in Table 9, six studied countries implement policies towards raising population growth and fertility rates. Those countries have respectively the oldest populations in the post-Soviet space. Government of Kazakhstan, in its turn, implemented policies to aid population growth albeit policy on fertility is targeted towards maintaining the observed level, while in Turkmenistan, the respective policies are applied in the opposite way.

As analysed in Chapter 8, the burden of NCDs that accompanies population ageing process is increasing in all of the studied countries. All of the governments consider the prevalence of NCDs in their countries as a matter of major concern (Tab. 8).

Further analysis focuses on a more detailed identification of policy responses related to population ageing in the post-Soviet space on the basis of country reports for the third 2012–2017 review cycle of the implementation of MIPAA. Armenia is positioned among the oldest countries of the former Soviet Union. As evidenced from earlier analysis carried out in Chapter 7, quantum and tempo of ageing experienced by Armenian population is also one of the highest during both phases among the studied countries. Among the reported changes (UNECE 2017), only the following sectoral measures being implemented in Armenia are related to population ageing and its consequences.

Public health:

- Geriatric and gerontological professions have been officially established at the state level to provide services to the older population. Courses on geriatrics and gerontology have been included to postgraduate educational programs and professional retraining programs.

Employment and social protection:

- New provision stating that “an employment contract, concluded by the initiative of the employer for indefinite term can be terminated by an employee, entitled for age pension upon reaching the age of 63 and by an employee, not entitled for age pension upon reaching the age of 65, if the corresponding ground is provided for by the employment contract” is thought to combat the age discrimination in the labour market.

Education and human capital:

- According to the new provision from 2014, older people are now able to receive supplementary education without any age restrictions.

Ageism:

- Cultural events are being organized in the libraries, nursing homes and other cultural centers for the older population.

Azerbaijan is currently experiencing the first phase and the highest quantum and tempo of ageing among the studied countries of the former Soviet Union. The proportion of older population aged 65 and over is expected to nearly triple from 6.7% to 17.5% during 2020–2050. The following reported measures undertaken in Azerbaijan (UNECE 2017), are related to ageing.

Public health:

- In the framework of National Program on Population and Demographic Development of the Republic of Azerbaijan adopted for the period of 2016–2025, the specific measures are being implemented towards creation and expansion of a network of gerontological cabinets.

Employment and social protection:

- The statutory retirement age is gradually rising until reaching 65 years for both males and females.
- In the framework of the National Employment Strategy adopted for the period of 2019–2030, new employment policy is set to be implemented based on the observed demographic trends aimed at harmonization of supply and demand of labour market (European Training Foundation 2019).
- Private pensions funds have been established for implementation of voluntary individual social security schemes.

Education and human capital:

- Dedicated training for 58 professions is provided to older population to ensure adaptation to observed changes in the labour market.

Ageism:

- Based on international experience, National Program on Strengthening Social Protection of Older Citizens of the Republic of Azerbaijan has been adopted to promote participation and integration of older population into society creating conditions to ensure full enjoyment of human rights.
- Special TV programs are broadcast to raise awareness among population on elimination of discrimination against older population and promotion of their rights to have equal access to employment opportunities.

Belarus is the second oldest country among post-Soviet states and is experiencing one of the highest quantum and tempo of ageing during the second phase where the proportion of older population aged 65 and over is estimated to increase from 14% to 21% in mere two decades during 2010–2030. Among others, the following measures implemented in Belarus (UNECE 2017) are related to combating the negative consequences of population ageing.

Public health:

- Professional geriatrics training is provided to medical staff as well as teaching staff from medical faculties at the faculty of gerontology and geriatrics of Belarussian medical academy. Seven geriatric centers have been established around the country.
- “Health schools” for older generation have been established to educate older population about diverse aspects of disease prevention.

Employment and social protection:

- New decree has been adopted to protect older workers from age discrimination reflected in legal job protection during the last two years before the statutory retirement age.
- Statutory retirement age is gradually rising until reaching 58 years for females and 63 years for males.

- The mechanism of deferral pension is being realized where older persons who decide to continue participating in the labour market after reaching the statutory retirement age receive higher pension after the actual retirement.
- Voluntary private pensions funds are developed to encourage population to use alternative pension schemes in addition to state funded pensions.

Education and human capital:

- An educational project to promote digital literacy of older population was launched in 2014 by one of the telecom companies.

As analysed in Chapter 7, quantum and tempo of ageing observed in Georgia is relatively low during both phases, however, by 2020 the proportion of older population has already reached 15.3%. Despite reporting its level of concern about the ageing of population as "major", Georgia has not submitted its country report on the implementation of MIPAA for the third analysis cycle.

Proportion of older population in Kazakhstan has passed the threshold of 7% in 2015 and the country is experiencing average quantum and tempo of ageing where the threshold of 21% is projected to be reached by the year 2085. The following reported measures undertaken in Kazakhstan (UNECE 2017), are related to ageing.

Public health:

- Nursing staff has been increased to improve the monitoring and care capacity after older persons with chronic diseases.
- Geriatrics as a medical specialty was established in 2009. New standards of gerontologic and geriatric care services were introduced in 2015.
- During 2011–2015, the state program on public health development was implemented to accentuate disease prevention and promotion of healthy lifestyle among the population.
- Consecutive state program on the development of health care "Densaulyk" adopted for the period 2016–2019 aimed at sustainable development of socially oriented national health care system in accordance with WHO guidelines. One of the priorities of the program was to develop a new system of compulsory social health insurance.

Employment and social protection:

- Statutory retirement age for females is gradually rising until reaching the age of 63 years.

Education and human capital:

- There exists one university of the third age located in Astana.

The analysis of the quantum and tempo of ageing carried out in Chapter 7 revealed that Kyrgyzstan currently belongs to the group of the youngest countries studied in this research where the proportion of older population reached only 4.7% in 2020. Albeit, the pace of the ageing process here is estimated to accelerate where the said proportion should more than double in the coming three decades. The government of Kyrgyzstan does not recognize population ageing to be the matter of major concern and did not submit its country report on the implementation of MIPAA for the third analysis cycle.

Quantum and tempo of population ageing in Moldova is expected to increase during the second phase of increase of older population proportion from 14% to 21% during 2025–2050. In Moldova the following measures reported in UNECE (2017) are related to population ageing.

Public health:

- 2007–2021 National Health Policy which, among other aims, targets promotion of health among older population.

Employment and social protection:

- 2007–2015 National Strategy on Employment Policies stimulated LFPR among older individuals and promoted active ageing.
- Statutory retirement age is set to gradual increase among females until reaching the age of 63 years.

Education and human capital:

- Vocational training for adults is established based on the decree of the Ministry of Education, however, most of the opportunities are not available for older persons.

Ageism:

- Mainstreaming gender equality in the context of ageing exists within legal framework but does not translate into practical action.

Russia is the third oldest country in the studied post-Soviet space where the quantum and tempo of population ageing is expected to double during the second period of increase in the proportion of older population from 14% to 21% during 2015–2040. Russia submitted its report on implementation of MIPAA for the third review cycle (UNECE 2017) and the following sectoral measures were identified to be related to population ageing and its consequences.

Public health:

- Geriatric services including professional training of specialists in geriatrics are implemented within Action Strategy for the Benefit of Senior Citizens in the Russian Federation up to 2025 which was adopted in 2016.

Employment and social protection:

- Aforementioned Action Strategy is also aimed to stimulate LFPR among older people.
- Older individuals wishing to continue participating in the labour market or seeking new employment opportunities have access to professional training and requalification.
- Statutory retirement age is gradually increasing until reaching the age of 60 years for females and 65 years for males.
- New instrument of deferred pension was introduced to allow older persons who continue working after reaching the statutory retirement age to postpone receiving old age pension and receive higher amount upon actual retirement.

Education and human capital:

- Universities of the third age offer professional education and training to older individuals across the country.

Ageism:

- Action Strategy for the Benefit of Senior Citizens in the Russian Federation up to 2025 aims to promote positive image of older age among population in general.
- New form of social service as “foster family for an older person” has been introduced where the receiving family receives monthly allowance from the state. The aim of the program is to give the opportunity to older individuals to lead a normal life and feel

socially protected potentially solving the problems of loneliness, helplessness and despair.

Tajikistan is the youngest country among the studied post-Soviet space and as revealed in Chapter 7 analysis results is ageing with average quantum and tempo where the proportion of older population is expected to reach 7% and 14% around 2045 and 2080 respectively. The government of Tajikistan recognizes ageing to be a matter of minor concern for its population and did not submit its country report on the implementation of MIPAA for the third review cycle.

The analysis of demographic trends in Chapter 7 showed that Turkmenistan is also one of the youngest countries among the studied ones and is ageing with similar quantum and tempo as Tajikistan. The government of Turkmenistan does not recognize ageing to be a matter of major concern and the country report on the implementation of MIPAA was not presented for the third review cycle.

Ukraine is the oldest country among the post-Soviet states where every fourth citizen is expected to be 65 and older by 2050. The quantum and tempo of ageing observed during the first phase was one of the lowest among the studied countries. Albeit, during the second phase observed in Ukraine during 2000–2035, the quantum and tempo has increased considerably. The following reported measures undertaken in Ukraine (UNECE 2017), are related to ageing.

Public health:

- 2017–2021 National Plan of Action on Ageing is aimed to ensure healthy and active ageing and improve the quality of life among older population.
- Regional medical and social centers as well as selected non-governmental organizations (NGOs) organize health groups to promote physical activity among older people.
- To address the issue of high alcohol consumption, excise duty rates were increased in 2010 and in 2016.

Employment and social protection:

- Statutory retirement age for females is gradually increasing until reaching 60 years.
- Employment protection is ensured for older persons during ten years before reaching the statutory retirement age.

Education and human capital:

- Individuals aged 45 and over with minimum of 15 years of work experience are entitled to one voucher for professional education and training aimed to improve employment opportunities and increase LFPR among older population.
- There are 753 universities of the third age around the county which contribute to the development of legal and information literacy and cultural activities among older population.

Ageism:

- Dedicated TV programs are broadcast to cover various social and health aspects of older age.

Quantum and tempo of population ageing in Uzbekistan is estimated to be among the highest in the studied post-Soviet space during the first phase of increase of older population proportion from 7% to 14% observed during 2030–2055. In Uzbekistan, the government recognizes ageing

as a matter of minor concern and only the following two measures among the reported ones in UNECE (2017) are related to mitigating the negative consequences of population ageing.

Public health:

- Veterans and older people in need receive free medical services.

Ageism:

- Fund "Nuronij" ensures implementation of measures to increase social participation of older people after retirement and organization of cultural and sport events for older population.

Current state of policy action related to population ageing in the studied countries is very limited. None of the countries have adopted a comprehensive plan of action on ageing aimed at mainstreaming the efforts in all affected spheres of development. The findings of this Sub-chapter confirm the hypotheses IV and V. European countries of the former Soviet Union experiencing advanced stages of ageing recognize the importance of the phenomenon though "major concern" is not translated into practical action at required level. Higher quantum and tempo of population ageing during the first phase attributable to Asian countries of the former Soviet Union is associated with weaker policy action. The results show that most of Asian countries do not recognize population ageing as a matter of "major concern" and do not take targeted measures to prepare for the future demographic trends. The studied countries lack all-encompassing strategic plan for policy action which can only be determined through rigorous analysis of the current and projected demographic trends as well as challenges of health and social sectors.

9.2 Policy assessment and recommendations

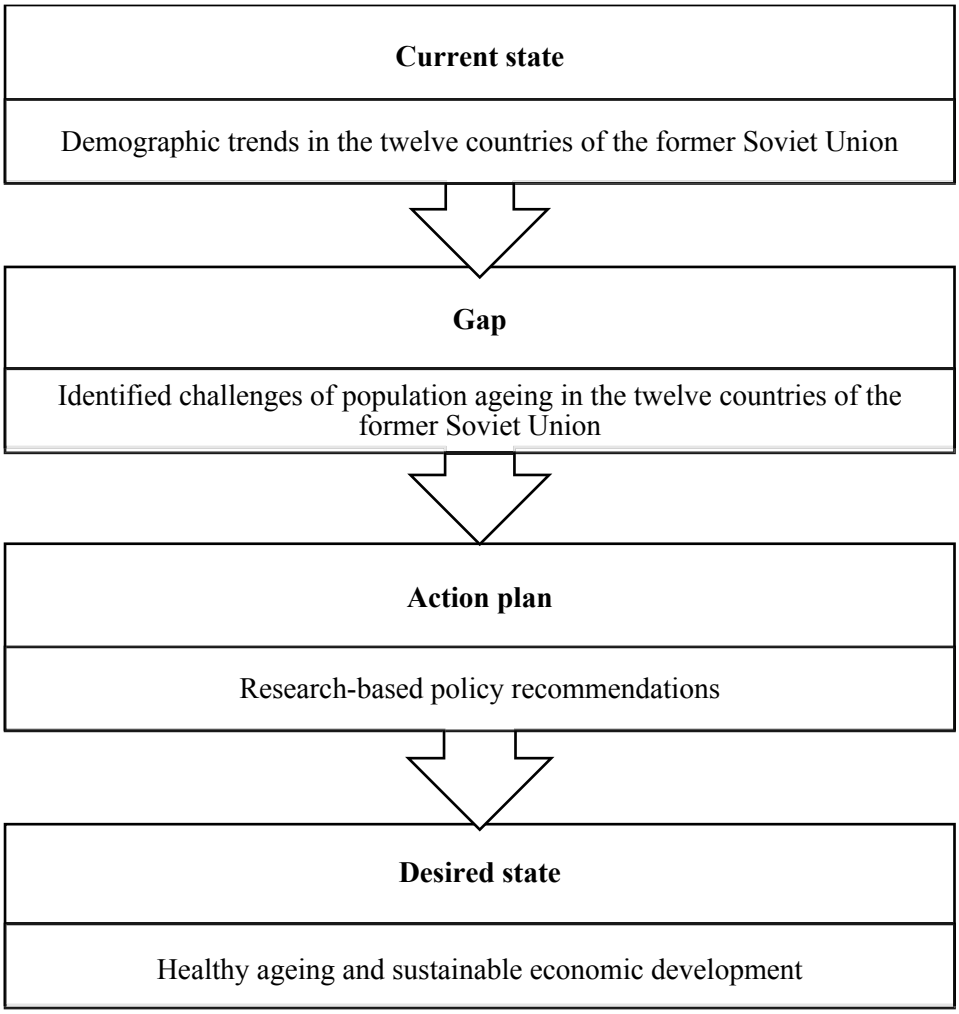
9.2.1 Gap analysis

This research was structured on the basis of gap analysis with identified steps required to meet the goal of this study. The four steps performed in the framework of gap analysis during this research are schematically summarized in Figure 35. Below is the succinct summary of each completed step presented in the preceding empirical Chapters.

The first step involved the examination of the current state of development in the twelve countries of the former Soviet Union through identification and analysis of the observed and projected demographic trends. Four countries of the studied post-Soviet space including Belarus, Georgia, Russia and Ukraine already belong to the UN category of "aged" societies where the proportion of older population aged 65 and over exceeds 14%. Those countries were ageing with a similar and relatively low quantum and tempo of 0.14–0.18 percentage points per year during the first period of older population increase from 7% to 14%. During the second period of increase from 14% to 21%, however, the quantum and tempo is expected to differ significantly between the four countries ranging from 0.18 percentage points per year in Georgia to 0.35 percentage points per years in Belarus. Belarus is expected to experience further ageing during the second phase with the highest quantum and tempo among all twelve studied countries. Three other countries including Armenia, Kazakhstan and Moldova are currently categorized as "ageing" societies where the proportion of older population aged 65 and over ranges between 7% and 14%.

Moldova is ageing with the lowest observed quantum and tempo of 0.14 percentage points per year among the studied countries during the first phase and is estimated to age further during the second phase at one of the highest quantum and tempo of 0.28 percentage points per year. Armenia and Kazakhstan are expected to be ageing with comparable quantum and tempo during both periods. Azerbaijan and Uzbekistan are estimated to experience the highest tempo and quantum during both phases of older population increase. Kyrgyzstan, Tajikistan and Turkmenistan are expected to undergo the process of ageing with average quantum and tempo observed among the studied countries.

Fig. 35 – Gap Analysis



Source: Author's compilation.

To conclude, the most privileged position, in terms of available time to develop a set of required policy strategies and start acting, belongs to Kyrgyzstan, Tajikistan and Turkmenistan. Azerbaijan and Uzbekistan are in possession of limited time before the windows of opportunities close and the demographic dividend would dissipate unused. All European countries of the former Soviet Union as well as Armenia and Georgia are the least privileged in terms of one of the most precious ingredients as "time" in the context of population ageing. Those countries have to start

acting immediately and closely monitor the effectiveness of implemented measures in order to mitigate the adverse consequences of the ageing phenomenon.

The second step entailed the identification of the actual gap in the form of challenges of population ageing in the studied countries. Upon performing the background research, public health, employment, social protection and ageism were identified as the most important sectors related to ageing. The following population ageing related challenges were identified in the sphere of public health in the twelve studied countries:

1) In Armenia:
   - LEB among males is considerably lower than the EU average.
   - The leading causes of burden of disease are NCDs.
   - The three most dominant risk factors for mortality and morbidity include high blood pressure, tobacco and dietary risks.
   - Out-of-pocket spending as share of total health spending is very high – 52%.
2) In Azerbaijan:
   - LEB among males is considerably lower than the EU average.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
   - The leading causes of burden of disease are NCDs.
   - The three most dominant risk factors for mortality and morbidity include high blood pressure, dietary risks and tobacco.
   - Based on available data from 2010, palliative care was not developed neither in terms of human health care resources nor specialized facilities.
   - Out-of-pocket spending as share of total health spending is very high – 74%.
   - UHC service coverage index is the lowest among the studied countries despite one of the highest total per capita HCE (PPP$). There exists potential problem of effective financial health resources allocation and management.
3) In Belarus:
   - LEB among males is considerably lower than the EU average.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
   - The leading causes of burden of disease are NCDs.
   - The three most dominant risk factors for mortality and morbidity include high blood pressure, dietary risks and tobacco. Alcohol use is also among the top risk factors and is responsible for over 10% of overall disease burden.
4) In Georgia:
   - LEB among males is considerably lower than the EU average.
   - Older males aged 60 had lower healthy life expectancy in 2016 compared to 2000. The increase in HALE60 among females was the lowest among the studied post-Soviet countries.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.

- The leading causes of burden of disease are NCDs.
- The three most dominant risk factors for mortality and morbidity include high blood pressure, dietary risks and tobacco.
- Palliative care is limited and not sufficient to meet the need, especially in rural areas.
- Out-of-pocket spending as share of total health spending is very high – 59%.

5) In Kazakhstan:
   - LEB among males is considerably lower than the EU average.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
   - The leading causes of burden of disease are NCDs.
   - The three most dominant risk factors for mortality and morbidity include high blood pressure, high body-mass index and tobacco. Alcohol use is also among the top risk factors and is responsible for nearly 8% of overall disease burden.
   - Population residing in remote rural areas does not have access to palliative care facilities.
   - Out-of-pocket spending as share of total health spending is high – 45%.
6) In Kyrgyzstan:
   - LEB among males is considerably lower than the EU average.
   - Older males aged 60 and over had lower remaining LE in 2020 compared to 2000.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
   - The leading causes of burden of disease are NCDs.
   - The three most dominant risk factors for mortality and morbidity include dietary risks, tobacco and high blood pressure. Alcohol use is also among the top risk factors and is responsible for approximately 8% of overall disease burden.
   - There exists only one palliative care facility in the country.
7) In Moldova:
   - LEB among males is considerably lower than the EU average.
   - The increase in LE60 observed during 2000–2020 among males was one of the lowest among the studied post-Soviet countries.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
   - The leading causes of burden of disease are NCDs.
   - The three most dominant risk factors for mortality and morbidity include high blood pressure, dietary risks and tobacco. Alcohol use is also among the top risk factors and is responsible for nearly 11% of overall disease burden.
   - Specialized palliative care facilities do not exist, the service is provided through home palliative care teams.
8) In Russia:
   - LEB among males is considerably lower than the EU average.

- Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
- The leading causes of burden of disease are NCDs.
- The three most dominant risk factors for mortality and morbidity include high blood pressure, tobacco and dietary risks. Alcohol use is also among the top risk factors and is responsible for nearly 11% of overall disease burden.
- Out-of-pocket spending as share of total health spending is high – 45%.

9) In Tajikistan:
   - LEB among males is considerably lower than the EU average.
   - HALE60 among males has practically stagnated during the last two decades during 2000–2016.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
   - The leading causes of burden of disease are NCDs.
   - The three most dominant risk factors for mortality and morbidity include malnutrition, high blood pressure and dietary risks. It is the only country in the post-Soviet space where unsafe water, sanitation and handwashing (WaSH) is among the top ten risk factors responsible for over 3% of overall disease burden.
   - There is a lack of human and physical palliative care resources in the country.
   - Out-of-pocket spending as share of total health spending is very high – 57%.
10) In Turkmenistan:
   - LEB among both females and males is considerably lower than the EU average.
   - The increase in HALE60 among females was one of the lowest among the studied post-Soviet countries.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
   - The leading causes of burden of disease are NCDs.
   - The three most dominant risk factors for mortality and morbidity include high blood pressure, dietary risks and high body-mass index. Alcohol use is also among the top risk factors and is responsible for over 7% of overall disease burden.
   - System of palliative care is not established in the country.
   - One of the highest total per capita HCE (PPP$) among the studied countries is not associated with HALE60 which is one of the lowest observed among post-Soviet states. There exists potential problem of effective financial health resources allocation and management.
11) In Ukraine:
   - LEB among males is considerably lower than the EU average.
   - Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
   - The leading causes of burden of disease are NCDs.

- The three most dominant risk factors for mortality and morbidity include high blood pressure, dietary risks and tobacco. Alcohol use is also among the top risk factors and is responsible for nearly 10% of overall disease burden.
- Palliative care is not part of public health system and there exists no national strategy on its organization and implementation.
- Out-of-pocket spending as share of total health spending is high – 47%.

12) In Uzbekistan:

- LEB among males is considerably lower than the EU average.
- HALE60 among males has practically stagnated during the last two decades during 2000-2020.
- Both older females and males aged 60 had lower life expectancy in 2020 compared to 2000.
- Burden of disease expressed in DALYs rate for all causes is considerably higher compared to EU average.
- The leading causes of burden of disease are NCDs.
- The three most dominant risk factors for mortality and morbidity include high blood pressure, dietary risks and high body-mass index.
- Out-of-pocket spending as share of total health spending is high – 44%.

The following population ageing related challenges were identified in the sphere of employment and social protection in the twelve studied countries:

1) In Armenia:

- Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at nearly 20% in 2020 and is expected to reach around 25% by 2050.
- Potential support ratio (expressed as the ratio of working-age population aged 15–64 per older individual aged 65 and over) is decreasing. It is expected to drop from 5.7 to 2.9 during 2020–2050.
- Low overall LFPR among females – 47.0%.
- Considerably low LFPR among females aged 55–64 – 55.2%.
- Remaining LE after the statutory retirement age is considerably low among males – 8.1 years.

2) In Azerbaijan:

- Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at nearly 16% in 2020 and is expected to reach nearly 23% by 2050.
- Potential support ratio is decreasing. It is expected to undergo the sharpest drop among the studied countries from 10.3 to 3.7 during 2020–2050.
- Considerably low LFPR among individuals aged 55–64 – 42.1% for females and 54.1% for males.
- Remaining LE after the statutory retirement age is very low among males – 6.8 years.

3) In Belarus:
   - Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at over 22% in 2020 and is expected to reach approximately 25% by 2050.
   - Potential support ratio is decreasing. It is expected to drop from 4.3 to 2.5 during 2020–2050.
   - Comparatively low overall LFPR among females – 57.3%.
   - Very low LFPR among females aged 55–64 – 39.0%. Insufficient level of LFPR among males aged 55–64 – 66.3%.
   - Remaining LE after the statutory retirement age is very low among males – 7.3 years.
4) In Georgia:
   - Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at nearly 21% in 2020 and is expected to increase further.
   - Potential support ratio is decreasing. It is expected to drop from 4.2 to 2.8 during 2020–2050.
   - Comparatively low overall LFPR among females – 57.4%.
   - Remaining LE after the statutory retirement age is very low among males – 4.1 years.
5) In Kazakhstan:
   - Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at nearly 16% in 2020 and is expected to increase further.
   - Potential support ratio is decreasing. It is expected to drop from 8.0 to 4.5 during 2020–2050.
   - Considerably low LFPR among females aged 55–64 – 45.7%.
   - Remaining LE after the statutory retirement age is very low among males – 5.8 years.
6) In Kyrgyzstan:
   - Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at 12% in 2020 and is expected to reach nearly 17% by 2050.
   - Potential support ratio is decreasing. It is expected to undergo a substantial drop from 13.2 to 6.4 during 2020–2050.
   - Low overall LFPR among females – 44.5%.
   - Very low LFPR among females aged 55–64 – 38.0%.
   - Remaining LE after the statutory retirement age is very low among males – 4.2 years.
7) In Moldova:
   - Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at nearly 19% in 2020 and is expected to reach around 30% by 2050.

- Potential support ratio is decreasing. It is expected to drop from 5.7 to 2.8 during 2020–2050.
- Low overall LFPR among both males and females at 45.8% and 40.0% respectively.
- Very low LFPR among individuals aged 55–64 – 37.7% for females and 56.2% for males.
- Remaining LE after the statutory retirement age is very low among males – 4.4 years.

8) In Russia:
   - Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at 21% in 2020 and is expected to increase further.
   - Potential support ratio is decreasing. It is expected to drop from 4.3 to 2.6 during 2020–2050.
   - Comparatively low overall LFPR among females – 54.4%.
   - Considerably low LFPR among females aged 55–64 – 41.6%. Insufficient level of LFPR among males aged 55–64 – 62.3%.
   - Remaining LE after the statutory retirement age is very low among males – 5.3 years.
9) In Tajikistan:
   - Potential support ratio is decreasing. It is expected to undergo a significant drop from 18.7 to 8.3 during 2020–2050.
   - Very low overall LFPR among both males and females at 52.9% and 31.3% respectively.
   - Very low LFPR among females aged 55–64 – 27.8%. Insufficient level of LFPR among males aged 55–64 – 63.0%.
   - Remaining LE after the statutory retirement age is very low among males – 5.6 years.
10) In Turkmenistan:
   - Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at only 10% in 2020 though is expected to reach over 17% by 2050.
   - Potential support ratio is decreasing. It is expected to undergo a substantial drop from 13.5 to 6.2 during 2020–2050.
   - Comparatively low overall LFPR among females – 51.3%.
   - Very low LFPR among females aged 55–64 – 36.0%.
   - Remaining LE after the statutory retirement age is extremely low among males – 2.5 years.
11) In Ukraine:
   - Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at 21% in 2020 and is expected to reach around 25% by 2050.
   - Potential support ratio is decreasing. It is expected to drop from 4.0 to 2.4 during 2020–2050.
   - Low overall LFPR among females – 46.5%.

- Very low LFPR among individuals aged 55–64 – 34.6% for females and 46.9% for males.
- Remaining LE after the statutory retirement age is very low among males – 6.8 years.

12) In Uzbekistan:

- Workforce is ageing: the proportion of working-age population aged 55–64 years in total workforce was estimated at only 12% in 2020 though is expected to reach around 19% by 2050.
- Potential support ratio is decreasing. It is expected to undergo a significant drop from 13.9 to 5.5 during 2020–2050.
- Comparatively low overall LFPR among females – 52.3%.
- Very low LFPR among females aged 55–64 – 36.5%.
- Remaining LE after the statutory retirement age is considerably low among males – 9.4 years.

Due to lack of detailed longitudinal data on ageism it was not possible to carry out in-depth analysis of ageist attitudes in the studied countries.

9.2.2 Research-based policy recommendations

The governments of the post-Soviet countries should consider multi-faceted approach to development of effective action plans on mitigating the negative consequences of population ageing. The results of this research show that the twelve countries of the former Soviet Union face analogous challenges in the context of ageing but at varying levels of intensity.

Evidence shows that the impact of pronatalist policies is questionable and it is difficult to assess the actual effects of those measures on fertility (Hoem 2008; Murray 2008). Frejka and Zakharov (2013) argue that the recent pronatalist family measures adopted in Russia were not successful in raising cohort fertility. The post-Soviet states studied in this research should adapt their economies and overall development to the inevitable processes of population ageing rather than try changing the course of fertility through costly pronatalist policies.

The following policy recommendations in the context of population ageing in the countries of the former Soviet Union were developed on the basis of analysed demographic trends, challenges associated with most effected health and social sectors and best international practices.

Primary priority should be given to promoting population health and health care services:

- Healthy population is the key to successful development at all levels. The twelve studied countries should adopt a life-course approach in promoting health and well-being of population at large as overall burden of disease is considerably high and excess adult mortality among males consequently results in low life expectancy among males which is dramatically lower than that observed among females.
- With ageing populations, matters become more complicated in the context of increasing prevalence of NCDs and the studied countries are not prepared to meet the demands for palliative and long-term care. This should be addressed on both national and local levels with special regards to remote rural areas.

- Dietary risks, tobacco and alcohol use were among the most dominant risk factors underlying the burden of disease in the studied countries. In post-Soviet ageing societies, healthcare system should be redesigned shifting the focus on prevention of diseases through awareness campaigns and promotion of healthy diets and physical activity. Policy measures aimed at drastic reduction of tobacco and more importantly alcohol use, are of vital importance. This could be achieved through imposing higher excise taxes and redirecting those revenues to public healthcare budgets.
- Policy measures aimed at compression of morbidity will help older population to remain in good health for a longer period which would lead to reduced need for health and long-term care resources and older people would be more likely to remain in the labour force for longer period contributing to economic development.
- Countries of the former Soviet Union should also reconsider healthcare funding schemes as in most of the countries out-of-pocket spending exceeds 40% of total health spending. High healthcare costs put a strain on the household budgets, especially among the older population. In Armenia, for instance, the poverty level among older population aged 65 and over is at 32% (UNECE 2017).
- Azerbaijan and Turkmenistan should prioritize the monitoring of financial management of healthcare systems and its effectiveness as, compared to other post-Soviet states, high total per capita HCE in those countries is not associated with high health service coverage and healthy life expectancy of older population respectively.

Challenges associated with employment and social protection in the ageing post-Soviet societies could be mitigated through the following policy measures:

- The priority should be given to increasing LFPR in all of the studied countries. The analysis revealed very low LFPR among females and working-age group of 55–64 years. The rise of LFPR among females could be achieved through policy measures authorizing flexible working hours and ensuring availability of state-funded childcare facilities which would allow mothers to combine work and family responsibilities. Low LFPR among older working-age groups could be addressed through targeted measures combating age discrimination by employers and workforce training. Older workers should be encouraged to participate in trainings to update their skills. This type of training could be offered through multiple channels including existing universities of the third age in some post-Soviet states or specialized programs to be organized by the employers to help the older employees keeping up with technological progress in the labour market. The rise in LFPR can certainly not occur unless the supply side policy schemes are not realized accordingly. Effective policy measures aimed at increasing employment opportunities, where rural areas are given special attention, may also contribute to decreasing the massive emigration rates among working-age population observed in some of the countries of the former Soviet Union.
- Labour productivity is an important indicator which could not be measured in the framework of this research due to data limitations. Post-Soviet states should monitor the labour productivity of their workforce and adopt policy measures targeted at raising

human capital of older workers through promotion of formal education and professional training.

- As mentioned earlier in this research, the effectiveness of mechanical raise in the statutory retirement age alone in the countries of the former Soviet Union, to combat the increasing pressure on social security resulting in the context of population ageing, is questionable. LEB at birth observed among males in the countries of the former Soviet Union is very low. Population health, LFPR, unemployment, labour productivity and existing social security schemes should be addressed before or in conjunction with raising the statutory retirement age.

Countries of the former Soviet Union make efforts to integrate instruments tackling intergenerational solidarity and engagement of older people in the societal life. However, the effectiveness of those measures should be monitored at the state level. This requires the availability of data on ageist attitudes observed among population at large. Dedicated sample surveys could help to collect the data on prevalence of ageism and formulate and implement targeted policy measures to combating the discrimination of older people at all levels.

Overall, with increasing proportion of older population aged 65 and over, governments of the former Soviet Union should predominantly address the economic vulnerability of older individuals and ensure their economic security.

Ageing related public policies in the post-Soviet space should be integrated horizontally across all spheres of state development and vertically across national, regional and local levels engaging all stakeholders from government authorities to businesses, NGOs and individuals. We recommend using a Delphi study approach to integrate interdisciplinary perspectives from national experts for developing a comprehensive plan of action on ageing in each studied country. Successful performance and positive results cannot be achieved without regular monitoring and evaluation of implemented ageing related public policies.

Chapter 10

Discussion of results and implications

10.1 Summary of results

This doctoral thesis has demonstrated that population ageing and its dynamics is an important concern even for post-Soviet countries with relatively young population structures. Urgent action is required to implement corresponding policy interventions to mitigate and eliminate the upcoming negative consequences and utilize potential opportunities to promote the well-being of older population which is growing both in absolute and relative terms, and ensure sustained economic development.

This research gives new insight on the quantum and tempo of population ageing and how it is related to the existing and upcoming challenges in public health, employment, social protection and ageism in the twelve countries of the former Soviet Union. The five objectives set in the beginning of this study were met through gap analysis approach which served as the guiding structural principle of this research.

Within the first step of gap analysis, demographic determinants of population ageing in the twelve countries of the former Soviet Union were analysed. Those included the decline in fertility, the increase in life expectancy and the role of migration. The age and sex structure changes taking place in the studied countries were also evaluated. Further, the quantum and tempo of population ageing in the post-Soviet countries was estimated using the new proposed measure which delimits the process into two crucial thresholds when the proportion of older population increases from 7% to 14% and from 14% to 21%. The results show that the process of ageing is accelerating in all of the studied countries apart from Azerbaijan which is expected to undergo dramatic changes in population structure in the coming two decades. Population of Azerbaijan is expected to age with 0.47 percentage points per year during the first phase and slow down during the second phase when the quantum and tempo is estimated to reach 0.28 percentage points per year (still one of the highest quantum and tempo to be observed among the twelve countries during the second phase). Even European countries of the former Soviet Union with already older population structures (compared to Asian studied countries) are estimated to experience nearly twice as intensive process of population ageing during the second phase when the quantum and tempo is

expected to reach 0.26 percentage points per year on average compared to currently observed 0.15 percentage points during the first phase. Asian countries of the studied post-Soviet space are expected to age with a high quantum and tempo already during the first phase.

Hypotheses I and II formulated in the beginning of this study were confirmed through the hierarchical agglomerative cluster analysis. There exists a correlation between fertility decline, the extent of age and sex structural changes and geographical location of the studied countries. Asian countries are expected to experience higher quantum and tempo of population ageing compared to European countries since the timing and extent of age-structural shifts are closely related and are more pronounced in Asian countries.

The second step of gap analysis incorporated the estimation of the actual gap through the analysis of public health, employment, social protection and ageism and identification of respective challenges related to population ageing. The results indicate that the exorbitant difference between male and female LEB observed in Belarus, Georgia, Moldova, Kazakhstan, Russia and Ukraine is caused by the high burden of premature mortality observed among adult males. The three dominant risks factors for mortality and morbidity in the studied countries include high blood pressure, dietary risks and tobacco. Alcohol use is also among the top risk factors, especially in European countries where it is, on average, responsible for nearly 11% of overall disease burden. Virtually all of the post-Soviet countries experience shortage of palliative care facilities and trained personnel. This could further threaten the public health care provision and efficiency in light of the increasing number and proportion of older population coupled with noncommunicable chronic diseases as the leading causes of burden of disease.

Population ageing related challenges in labour sector identified within gap analysis included very low LFPR, decreasing PSR, workforce ageing and very low remaining LE among males observed after the statutory retirement age. Average total LFPR among females among the studied countries does not exceed 51% while in Tajikistan less than one third of females are actively participating in the labour market. Apart from Georgia, LFPR among the working-age population aged 55–64 years are low both among females and males. The lowest LFPR among males aged 55–64 are observed in Azerbaijan, Moldova and Ukraine with 54%, 56% and 47% respectively. The burden placed on the working-age population is augmenting in all of the studied countries as PSR is expected to decrease dramatically in the coming decades, where in European countries it is expected to drop from already low observed levels. The findings confirmed the hypothesis III having demonstrated that the pace of demographic changes is positively correlated with the extent of challenges in the studied countries. Higher quantum and tempo of ageing estimated to be experienced by European countries during the first phase and by Asian countries during both phases is associated with greater projected challenges in public health, employment and social protection sectors in the twelve studied countries. The analysis of the existing ageing related policy action has revealed that most of Asian countries do not recognize the phenomenon as a matter of “major concern”, whereas all of the European countries do so. However, none of the countries have adopted a strategic research-based plan of action on mitigating the negative consequences of population ageing. The results confirmed the hypotheses IV and V. Ageing awareness at the state level is not correlated with practical action in the form of comprehensive

and thoroughly elaborated and implemented public policies. There exists a relationship between quantum and tempo of ageing and the extent of policy action in the twelve studied countries. Presently, higher quantum and tempo of population ageing during the first phase is associated with weaker policy action.

Within the last step of gap analysis, policy recommendations, elaborated on the basis of observed and expected demographic trends, identified ensuing challenges and international best practice, were proposed to efficiently mitigate the negative consequences of ageing and utilize the potential opportunities to reach the desired state of healthy ageing and sustainable economic growth in the countries of the former Soviet Union.

10.2 Research limitations and recommendations for future research

It is important to note about the research limitations this study has faced. The biggest limitation was lack of detailed longitudinal data decomposed by age (and/or age groups) and sex. As mentioned in data section, the national statistical agencies of the twelve post-Soviet countries do not provide detailed demographic, health and social indicators. As a result, the data required for the analysis had to be gathered from various sources and tabulated separately for the twelve studied countries of the former Soviet Union. Demographic analysis was based on the data extracted from UN WPP 2019 Revision. However, WPP data required for this study is only provided by five-year intervals. This limitation did not allow to carry out a more precise analysis and estimation of the quantum and tempo of population ageing. Besides, the data prior 1950 is not available for either of the population indicators. Those factors did not allow to analyse the data from historical perspective to identify the trend of age-sex structural changes and homogeneity or heterogeneity of the studied countries in terms of population development that occurred prior the establishment of the Soviet Union and how the new regime affected the course of demographic change during the first decades prior 1950. Lack of longitudinal representative data on ageism and elder maltreatment did not allow to carry out detailed data analysis with regards to these challenges. This is a big drawback in terms of assessment of population ageing related challenges since evidence from other countries indicates towards prevalence of ageist attitudes and elder maltreatment while in the context of population ageing these issues are expected to become more aggravated and have to be addressed at the state and local levels. Finally, since required data was not available in open access from the national statistical agencies, it was not possible to carry out the cross-comparison with WPP, WHO and IHME data to evaluate its quality and potential underreporting or overreporting of selected indicators analysed in this study.

Another limitation concerns lack of theoretical foundation in public policy analysis on population ageing. Established theoretical framework on ageing policy analysis could become a powerful tool to use the research evidence in the process of policymaking. Such methodology should provide a foundation to enable both the researchers and policy makers to generate straightforward understanding of how to reveal the underlying challenges and risks, which particular areas need to be addressed and what kind of policy instruments could be more effective

in a given setting. This limitation in theoretical foundation can be addressed by future studies to shape and enhance the area of policy analysis in population ageing.

There exists a real lack of research on population ageing in the countries of the former Soviet Union. This study calls for the national experts in the twelve studied countries to undertake diversified and specialized research on ageing to start the constructive dialogue with policy makers as the upcoming challenges of population ageing coupled with already existing challenges in public health and labour market in the post-Soviet countries have to be addressed immediately through effective policy action informed by thoroughly analysed data from all relevant and affected sectors.

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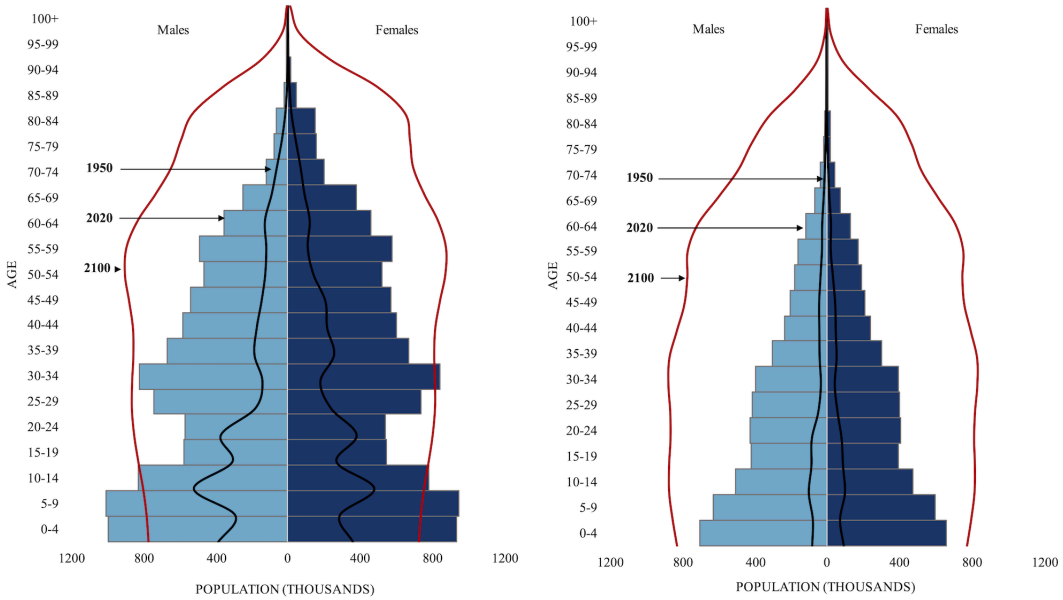
APPENDICES

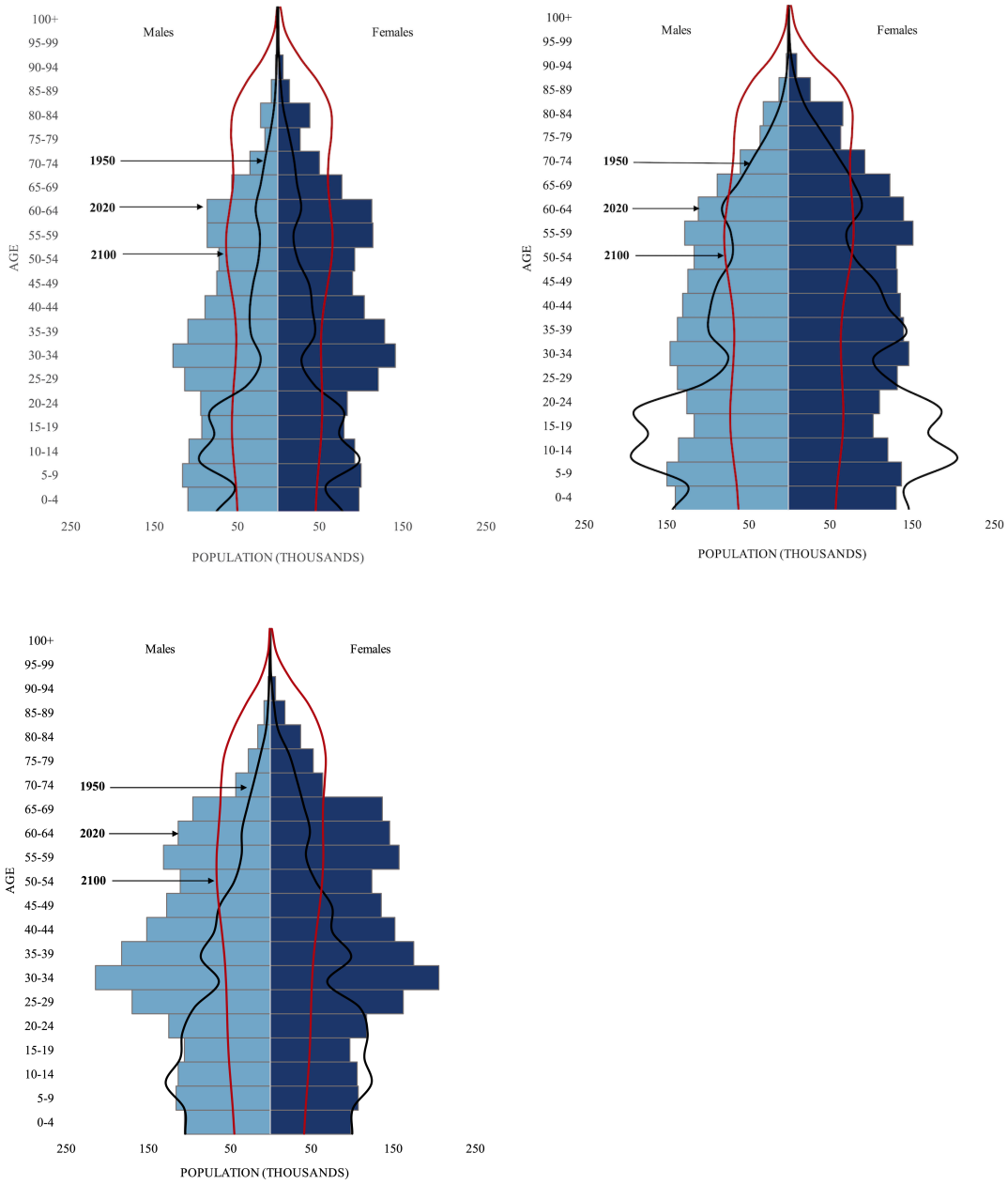
Appendix 1.1 – Population pyramids of Kazakhstan and Tajikistan, 1950, 2020, and 2100.



Note: This group includes Kazakhstan with population size of 18.6 million and Tajikistan with current population size of around 9.3 million which was assigned to this group based on projected dramatic increase in the population size towards 2100 to approximately 25.3 million people.

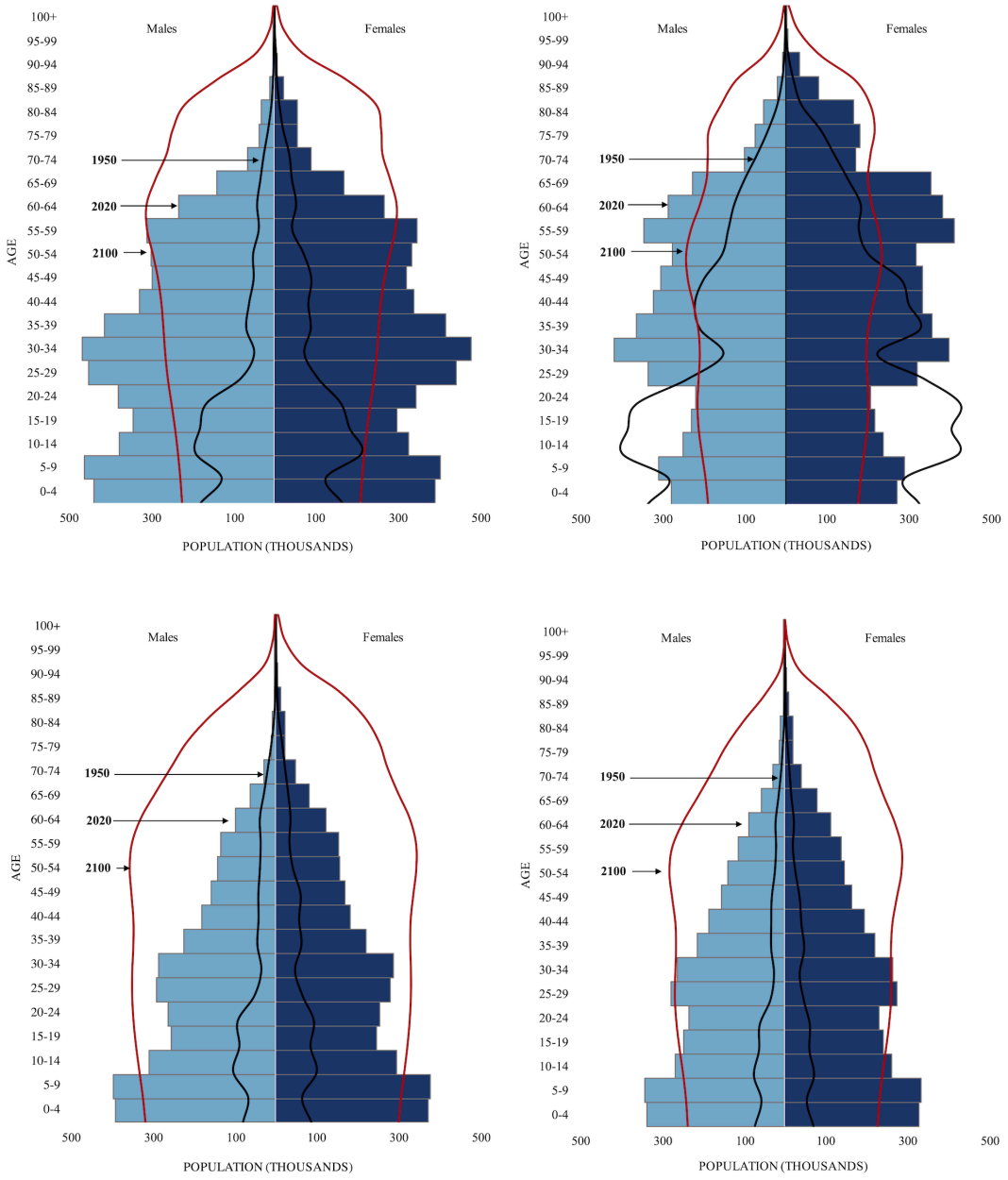
Source: Author's calculations based on United Nations (2019b) data.

Appendix 1.2 – Population pyramids of Armenia, Georgia and Moldova – countries with the smallest population sizes below 5 million, 1950, 2020, and 2100.



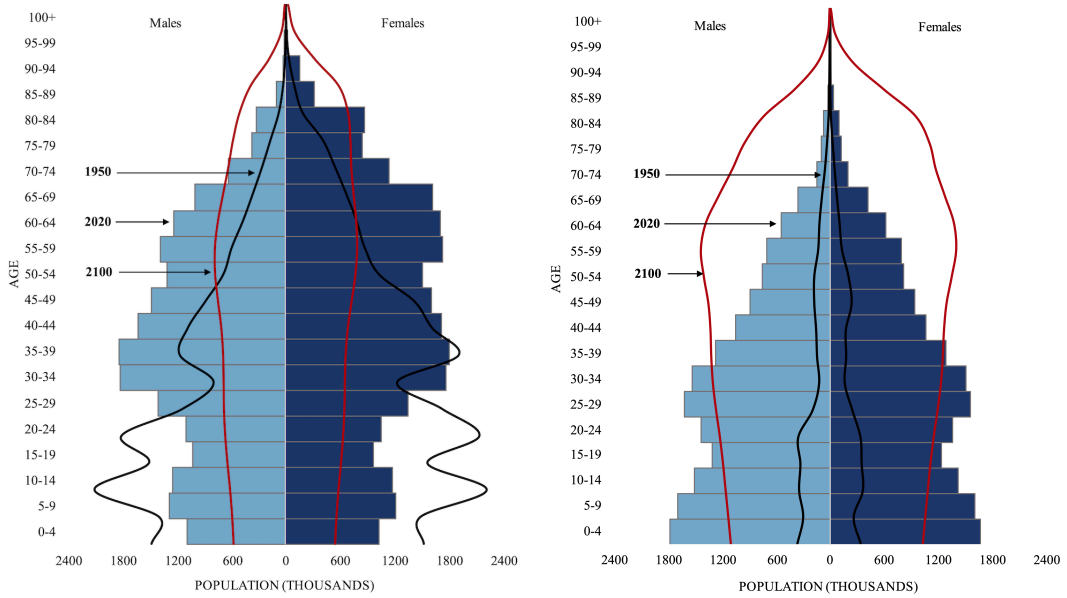
Source: Author's calculations based on United Nations (2019b) data.

Appendix 1.3 – Population pyramids of Azerbaijan, Belarus, Kyrgyzstan and Turkmenistan – countries with population size between 5 and 10 million, 1950, 2020, and 2100.



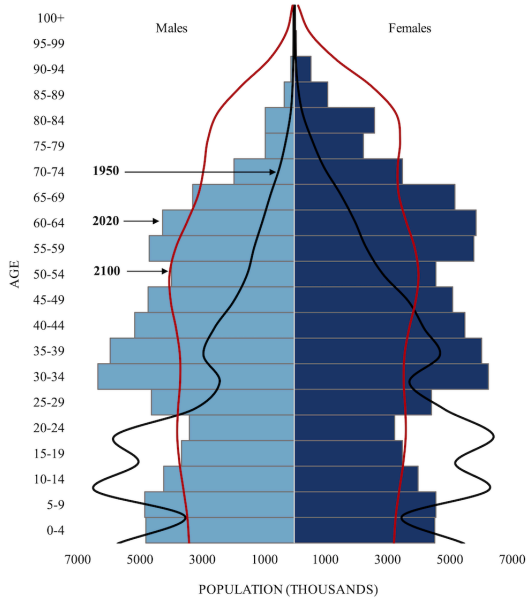
Source: Author's calculations based on United Nations (2019b) data.

Appendix 1.4 – Population pyramids of Ukraine and Uzbekistan with current population sizes in the range of 30–45 million, 1950, 2020, and 2100.



Source: Author's calculations based on United Nations (2019b) data.

Appendix 1.5 – Population pyramid of Russia with current population size of 145.9 million, 1950, 2020, and 2100.



Source: Author's calculations based on United Nations (2019b) data.

Appendix 2 – Input data for hierarchical cluster analysis

Country	TFR	LEB	HALE60	OADR	Median age	Speed of early PA	Speed of late PA
Armenia	2	75	15	18	35	0	0
Azerbaijan	2	73	15	10	32	0	0
Belarus	2	75	15	23	40	n/a	0
Georgia	2	74	15	24	38	0	0
Kazakhstan	3	73	14	13	31	0	0
Kyrgyzstan	3	71	14	8	26	0	0
Moldova	1	72	14	17	38	0	0
Russia	2	72	15	24	40	0	0
Tajikistan	4	71	14	5	22	0	n/a
Turkmenistan	3	68	14	7	27	0	n/a
Ukraine	1	72	15	25	41	0	0
Uzbekistan	2	72	15	7	28	0	0

Source: United Nations (2019b); WHO (2020b) and author's calculations.

Appendix 3 – Types of old-age income security programs in the twelve countries of the former Soviet Union, 2018

Country	Contributory		Non-contributory		
	Flat-rate	Earnings-related	Means-tested	Universal	Individual accounts
Armenia	•	•	•		•
Azerbaijan	•	•	•		
Belarus	•	•	•		
Georgia				•	•
Kazakhstan		•	•	•	•
Kyrgyzstan	•	•	•		•
Moldova		•	•		
Russia	•	•	•		•
Tajikistan		•	•		•
Turkmenistan		•	•		
Ukraine		•	•		
Uzbekistan		•	•		•

Notes: Based on ISSA definition: **Contributory flat-rate pension:** A pension amount that is independent of earnings, but can vary depending on length of service, residency, or other factors. It is financed by payroll tax contributions from employees, employers, or both.

Contributory earnings-related pension: A pension that is based on earnings. It is financed by payroll tax contributions from employees, employers, or both.

Non-contributory means-tested pension: A pension paid to eligible persons whose own or family income, assets, or both fall below certain limits. It is generally financed through government contributions, with no contributions from employers or employees.

Non-contributory universal pension: A pension paid to eligible persons based primarily on residency and not earnings or financial means. It is generally financed through government contributions, with no contributions from employers or employees.

Individual accounts: Employees and, in some cases, employers must contribute a certain percentage of earnings to an individual account managed by a public or private fund manager chosen by the employee. The accumulated capital in the individual account is used to purchase an annuity, make programmed withdrawals, or a combination of the two and may be paid as a lump sum.

Source: ISSA (2018a; 2018b).

Appendix 4.1 – World Values Survey Question V159: Social position of people over 70 years

	Number of respondents	Extremely low position in society	2	3	4	5	6	7	8	9	Extremely high position in society	Inapplicable	No answer	Don't know
Armenia	1 100	15.5	12.9	13.5	10.0	15.5	6.9	7.8	5.9	2.6	5.5	n/a	0.2	3.7
Azerbaijan	1 002	3.4	6.1	11.9	13.1	16.2	11.9	11.9	13.0	6.7	5.3	n/a	n/a	0.5
Belarus	1 535	9.8	12.2	11.1	11.0	14.9	11.0	10.2	6.6	3.3	1.9	n/a	n/a	8.0
Georgia	1 202	9.9	11.4	16.7	12.9	18.3	8.3	7.8	6.0	3.2	3.2	n/a	n/a	2.2
Kazakhstan	1 500	9.8	7.7	8.5	10.6	17.2	10.0	8.6	8.6	4.9	7.3	n/a	6.7	n/a
Kyrgyzstan	1 500	4.6	6.1	6.0	7.2	8.9	10.7	10.8	10.1	12.4	15.5	n/a	0.1	7.5
Russia	2 500	18.2	15.0	14.4	11.4	14.1	7.6	5.2	4.1	2.1	2.4	n/a	n/a	5.4
Ukraine	1 500	16.5	14.1	16.0	12.9	10.8	10.2	5.5	4.4	2.5	2.0	n/a	n/a	5.1
Uzbekistan	1 500	2.9	2.4	2.5	4.0	10.4	10.6	8.9	8.5	11.3	33.7	n/a	4.7	n/a

Source: Compiled from Inglehart et al. (2014).

Appendix 4.2 – World Values Survey Question V161: People over 70 are viewed as friendly

	Number of respondents	Not at all likely to be seen like this	1	2	3	Very likely to be viewed that way	Dropped out survey	No answer	Don't know
Armenia	1 100	5.7	8.6	25.9	27.2	30.7	n/a	n/a	1.8
Azerbaijan	1 002	10.5	20.5	29.5	22.2	16.8	n/a	n/a	0.6
Belarus	1 535	2.9	11.5	27.6	36.6	14.4	n/a	n/a	7.0
Georgia	1 202	n/a	1.4	7.2	26.4	64.2	n/a	n/a	0.7
Kazakhstan	1 500	0.7	5.2	12.9	40.4	34.5	n/a	6.2	0.1
Kyrgyzstan	1 500	6.2	16.3	19.9	31.9	15.7	n/a	0.5	9.5
Russia	2 500	5.5	11.5	27.2	28.8	23.0	n/a	n/a	4.1
Ukraine	1 500	4.9	13.8	26.9	31.1	16.0	n/a	n/a	7.3
Uzbekistan	1 500	0.5	3.1	7.6	19.7	67.5	n/a	0.2	1.4

Source: Compiled from Inglehart et al. (2014).

Appendix 4.3 – World Values Survey Question V162: People over 70 are viewed as competent

	Number of respondents	Not at all likely to be seen like this	1	2	3	Very likely to be viewed that way	Dropped out survey	No answer	Don't know
Armenia	1 100	4.3	10.0	28.9	27.1	27.7	n/a	n/a	2.0
Azerbaijan	1 002	3.6	7.2	22.5	36.8	29.5	n/a	n/a	0.4
Belarus	1 535	3.7	11.9	25.6	36.1	15.2	n/a	n/a	7.5
Georgia	1 202	0.2	1.2	7.6	26.2	63.4	n/a	n/a	1.5
Kazakhstan	1 500	1.3	7.6	16.0	35.7	32.1	n/a	7.3	0.1
Kyrgyzstan	1 500	4.1	12.3	22.3	31.9	15.9	n/a	0.5	12.8
Russia	2 500	6.4	14.3	27.4	29.5	17.2	n/a	n/a	5.1
Ukraine	1 500	5.0	14.2	29.1	28.1	13.8	n/a	n/a	9.7
Uzbekistan	1 500	0.7	1.7	9.7	25.1	60.8	n/a	0.1	1.8

Source: Compiled from Inglehart et al. (2014).

Appendix 4.4 – World Values Survey Question V163: People over 70 are viewed with respect

	Number of respondents	Not at all likely to be seen like this	1	2	3	Very likely to be viewed that way	Dropped out survey	No answer	Don't know
Armenia	1 100	3.4	7.9	19.6	24.1	44.1	n/a	n/a	1.0
Azerbaijan	1 002	1.5	3.2	12.0	22.6	60.1	n/a	n/a	0.4
Belarus	1 535	1.6	3.4	13.2	35.3	41.2	n/a	n/a	5.3
Georgia	1 202	0.1	1.0	5.6	21.1	71.8	n/a	n/a	0.4
Kazakhstan	1 500	0.5	2.7	6.2	27.1	58.4	n/a	5.2	0.1
Kyrgyzstan	1 500	1.1	3.9	8.9	28.3	47.3	n/a	0.4	10.1
Russia	2 500	2.3	4.8	15.9	25.1	48.4	n/a	n/a	3.5
Ukraine	1 500	3.1	8.2	23.6	28.2	30.2	n/a	n/a	6.7
Uzbekistan	1 500	0.1	0.3	1.9	15.0	81.2	n/a	n/a	1.5

Source: Compiled from Inglehart et al. (2014).

Appendix 4.5 – World Values Survey Question V164: Is a 70-year old boss acceptable

	Number of respondents	Completely unacceptable	2	3	4	5	6	7	8	9	Completely acceptable	Inapplicable	No answer	Don't know
Armenia	1 100	22.7	13.1	12.2	6.8	12.4	5.4	5.3	7.4	2.7	5.4	n/a	1.8	3.8
Azerbaijan	1 002	4.2	3.6	9.5	12.3	15.8	11.6	11.1	11.2	10.2	10.4	n/a	n/a	0.2
Belarus	1 535	16.1	11.9	12.9	12.0	11.9	12.6	8.3	6.7	4.0	3.1	n/a	n/a	0.5
Georgia	1 202	4.5	2.7	7.6	8.2	13.1	6.6	10.0	14.6	7.7	24.0	n/a	n/a	1.2
Kazakhstan	1 500	16.8	3.3	7.7	8.3	10.8	11.8	12.3	10.9	6.0	9.0	n/a	3.2	n/a
Kyrgyzstan	1 500	9.4	5.1	8.7	8.7	14.9	15.3	12.2	13.3	4.4	7.5	n/a	0.3	0.1
Russia	2 500	19.4	10.2	9.8	7.6	12.1	8.7	9.6	8.4	2.9	4.4	n/a	n/a	6.8
Ukraine	1 500	13.5	7.7	11.6	10.9	13.4	10.2	9.4	11.4	5.1	6.8	n/a	n/a	n/a
Uzbekistan	1 500	10.4	5.6	5.4	4.9	5.5	7.3	9.6	14.3	12.4	20.7	n/a	3.9	n/a

Source: Compiled from Inglehart et al. (2014).

Appendix 4.6 – World Values Survey Question V165: Older people are not respected much these days

	Number of respondents	Strongly agree	Agree	Disagree	Strongly disagree	Inapplicable	No answer	Don't know
Armenia	1 100	16.9	33.7	37.7	10.7	n/a	n/a	1.0
Azerbaijan	1 002	12.2	31.7	45.4	10.7	n/a	n/a	n/a
Belarus	1 535	9.3	34.5	46.3	9.3	n/a	n/a	0.6
Georgia	1 202	22.9	36.3	23.1	16.2	n/a	n/a	1.5
Kazakhstan	1 500	11.0	24.6	48.7	15.7	n/a	n/a	n/a
Kyrgyzstan	1 500	16.2	30.0	31.5	22.1	n/a	0.1	0.1
Russia	2 500	17.0	41.0	33.3	5.7	0.2	0.1	2.7
Ukraine	1 500	25.0	39.6	30.9	4.5	n/a	n/a	n/a
Uzbekistan	1 500	5.4	12.0	26.0	56.6	n/a	n/a	n/a

Source: Compiled from Inglehart et al. (2014).

Appendix 4.7 – World Values Survey Question V166: Older people get more than their share from the government

	Number of respondents	Strongly agree	Agree	Disagree	Strongly disagree	Inapplicable	No answer	Don't know
Armenia	1 100	0.3	3.6	34.4	60.9	n/a	n/a	0.8
Azerbaijan	1 002	4.1	12.9	51.0	31.9	n/a	n/a	n/a
Belarus	1 535	2.7	8.4	52.3	35.6	n/a	n/a	1.0
Georgia	1 202	0.8	3.3	19.6	75.2	n/a	n/a	1.0
Kazakhstan	1 500	3.3	7.9	53.2	35.6	n/a	n/a	n/a
Kyrgyzstan	1 500	13.8	31.3	32.9	21.8	n/a	0.2	0.1
Russia	2 500	1.8	6.7	45.5	43.5	0.1	n/a	2.5
Ukraine	1 500	1.4	4.2	47.6	46.8	n/a	n/a	n/a
Uzbekistan	1 500	2.8	9.0	32.1	56.1	n/a	n/a	n/a

Source: Compiled from Inglehart et al. (2014).

Appendix 4.8 – World Values Survey Question V167: Older people are a burden on society

	Number of respondents	Strongly agree	Agree	Disagree	Strongly disagree	Inapplicable	No answer	Don't know
Armenia	1 100	2.5	8.8	37.5	49.8	n/a	n/a	1.4
Azerbaijan	1 002	2.8	5.9	49.8	41.5	n/a	n/a	n/a
Belarus	1 535	3.8	16.9	45.3	33.1	n/a	n/a	1.0
Georgia	1 202	4.2	10.5	24.8	59.5	n/a	n/a	1.1
Kazakhstan	1 500	1.7	9.6	47.2	41.5	n/a	n/a	n/a
Kyrgyzstan	1 500	5.6	14.7	35.9	43.6	n/a	0.1	0.1
Russia	2 500	2.8	13.5	44.4	34.6	0.3	0.4	4.0
Ukraine	1 500	4.3	13.8	49.4	32.4	n/a	n/a	n/a
Uzbekistan	1 500	0.9	1.5	15.8	81.8	n/a	n/a	n/a

Source: Compiled from Inglehart et al. (2014).

Appendix 4.9 – World Values Survey Question V168: Companies that employ young people perform better than those that employ people of different ages

	Number of respondents	Strongly agree	Agree	Disagree	Strongly disagree	Inapplicable	No answer	Don't know
Armenia	1 100	4.8	29.2	39.7	15.8	n/a	0.2	10.2
Azerbaijan	1 002	13.0	49.3	32.1	5.5	n/a	n/a	n/a
Belarus	1 535	12.7	33.6	41.7	10.2	n/a	n/a	1.8
Georgia	1 202	5.9	29.4	35.0	21.0	n/a	0.6	8.2
Kazakhstan	1 500	11.3	29.4	42.5	16.7	n/a	n/a	n/a
Kyrgyzstan	1 500	15.9	39.5	32.9	11.3	n/a	0.1	0.2
Russia	2 500	7.1	27.1	40.3	12.8	0.3	0.2	12.2
Ukraine	1 500	9.3	33.7	43.6	13.4	n/a	n/a	n/a
Uzbekistan	1 500	19.5	30.9	25.5	23.8	n/a	0.3	n/a

Source: Compiled from Inglehart et al. (2014).