



A growing and ageing population

Global societal trends to 2030:
Thematic report 1

Benoit Guerin, Stijn Hoorens, Dmitry Khodyakov, Ohid Yaqub



EUROPE

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Abbreviations

ESPAS European Strategy and Policy Analysis System

EUISS European Institute for Security Studies

GDP gross national product

IIASA International Institute for Applied Systems Analysis

NCDs non-communicable diseases

NIC National Intelligence Council

OECD Organization for Economic Cooperation and Development

Preface

This Research Report forms part of our series on global societal trends and their impact on the EU in 2030. This analysis is embedded within the framework of the European Strategy and Policy Analysis System (ESPAS) set up to develop a lasting framework to assess global trends and to develop policy responses across EU institutions over the next institutional cycle (2014–2019). The first phase of the project assessed the long-term, international, domestic, economic and political trends facing the European Union over the next two decades; the second phase of the project split trends into three streams, namely the economy, governance and power, and society. RAND Europe’s assessment of likely global societal trends constituted ‘Trend Report 2 – Society’ for this second phase.

This report presents the evidence base, uncertainties and potential trajectories surrounding trends in one of the six major themes which form part of Trend Report 2 – Society, namely the growing and ageing global population. Other themes studied as part of this series include the rise of a global middle class; the spread of information and knowledge through technology, the new media and education; the empowerment of individuals; the role of migration and mobility; and transformations in the world of work and the labour market. Overall findings from all reports may be found in the Synthesis Report published by RAND Europe, while evidence for the other themes may be found in the research reports published as part of this series.

This work is based on desk research in the form of a non-systematic review of the academic and grey literature on the major trends for this theme. It includes additional information for each of the themes studied, which was harnessed through a Delphi with international participants, as well as a series of semi-structured interviews with experts from academia and think tanks, policymakers and leading thinkers from the private or voluntary sector further exploring the findings from the Delphi exercise and desk research. Acknowledgements, and a full list of contributors, can be found in the Synthesis Report.

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For more information about RAND Europe or this work, contact Stijn Hoorens (hoorens@rand.org).

Rue de la Loi 82
1040 Brussels, Belgium
Tel. +32 (0)2669 2400

Westbrook Centre, Milton Road
Cambridge CB4 1YG, UK
Tel. +44 1223 353 329

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Introduction

1.1. The context for this study and the European Strategy and Policy Analysis System effort

Over recent years, the European Union has experienced a number of challenges. Facing these issues has required much effort from European policymakers. These reflect the unstable and fast-changing global environment in which the Union is navigating. In the long term, this may challenge the Union's economic and political influence, and perhaps its ideals and values.

In this new context, expanding the Union's capacity to anticipate future challenges and outcomes and to coordinate responses across institutions will be crucial. The objective of this study was to help the European Union to prepare for a future strategic landscape that will be more competitive and perhaps less cooperative than before, and certainly more uncertain than a superficial reading of opinion pieces and forward-looking reports might suggest.

The European Strategy and Policy Analysis System (ESPAS) project emerged in 2010 when the European Commission sought to investigate the global trends that will prevail in 2030 and to determine the challenges that European policymakers will be faced with in the coming decades. Its purpose is embedded within a wider context of building a permanent EU forecasting capacity, relying on the collaboration of various EU institutions and actors in the individual Member States, and it also aims to set up a continuous framework to assess global trends and to develop policy responses across the EU institutional framework.

The initial effort, carried out by the EU Institute for Security Studies (EUISS 2012), aimed at assessing 'the long-term, international and domestic, political and economic environment facing the European Union over the next 20 years'. The report acted as a pilot project setting the scene for further investigation and evaluation of global trends in 2030 in the field of (i) international relations and governance, (ii) society, and (iii) macroeconomic trends.

In 2012, the Bureau of European Policy Advisers (BEPA) commissioned RAND Europe to investigate further the theme of societal changes by drawing from the experience of the pilot project, by analysing key global trends in this field and by drawing their implications for the Union. The task force at BEPA identified six main thematic areas which were to be refined, documented and analysed, namely:

1. The rise of a global 'middle class'
2. The role of new technologies, new media and increased access to education
3. The empowerment of individuals

4. The changing demography of a globalised world and its impact on different societies
5. The role of mobility and migrations and their impact on identities
6. Old and new labour – and work.

Each of the research reports published as part of this series revolves around one of the six themes. This report focuses on education, technology and connectedness. The overall findings from the analysis may be viewed in the Synthesis Report (Hoorens et al., 2013). The research team has sought to cluster the trends identified above into five major areas in the Synthesis Report. In addition, the Synthesis Report introduces a number of cross-cutting issues that may interact with each of these six themes to influence the long-term strategic landscape and the policy challenges that the European continent may face in the future. In doing so, it relies extensively on strategic and long-term analysis, an approach which may help policymakers grasp the contours of the future and understand how global trends are likely to interact, converge and influence the future landscape.

1.2. The methods used for this Research Report designed to set out the evidence base for major trends

This Research Report presents the reader with findings on demographic change, as well as on their impact on the EU landscape, including potential policy challenges for the next 20 years.

Several reports – most of which are referenced in this analysis – have attempted to describe, assess and determine which trends are likely to shape the international strategic landscape or the landscape of a specific region, the EUISS report and the regular efforts of the National Intelligence Council being perhaps among the most notable examples in this context. The objective of the research team as a result is not to replicate these existing efforts, but rather to bring the existing uncertainty surrounding these trends to policymakers' attention.

The findings analysed in this report are based on two phases of research, namely a non-systematic review of the literature available on each of the major trends listed under the six themes identified by ESPAS for the Society Trend Report, and analysis of the quantitative data available. Our approach is designed to identify the consensus as well as the disagreement on a given trend within a specific theme, and therefore to describe this trend, relying on previous analysis and literature. It has allowed the research team to identify the drivers behind the trends and the conditions and assumptions under which they will materialise. The team has sought to review and discuss the evidence for these assumptions and conditions and the level of uncertainty surrounding them. When appropriate, and relying on the assessment of this uncertainty, the researchers have been able to generate alternative narratives for specific trends, which stand in contrast to the consensus.

The second phase of the research (expert consultation) harnessed the knowledge of leading experts worldwide for each of the themes studied through an approach based on the Delphi method. This effort was followed by a series of interviews with leading academics, policymakers and thinkers from the private or voluntary sector to build on findings from the Delphi exercise. Information from the expert consultation phase was used to discuss and to uncover further the surrounding uncertainty for each of the global trends derived from the literature review.

This approach is not, of course, without limitations. The report considers trends one by one and therefore in isolation from all others when in fact they are likely to interact with each other. We try to alleviate this issue by making clear the assumptions of the literature we review.

By emphasising uncertainty and by attempting to raise policymakers' awareness of alternative narratives and paths, we hope to contribute to the debate on global trends that will prevail in 2030, and to facilitate the goals of greater flexibility and resilience. While this approach contrasts with previous, widely publicised strategic analysis reports, it also looks to complement these analyses.

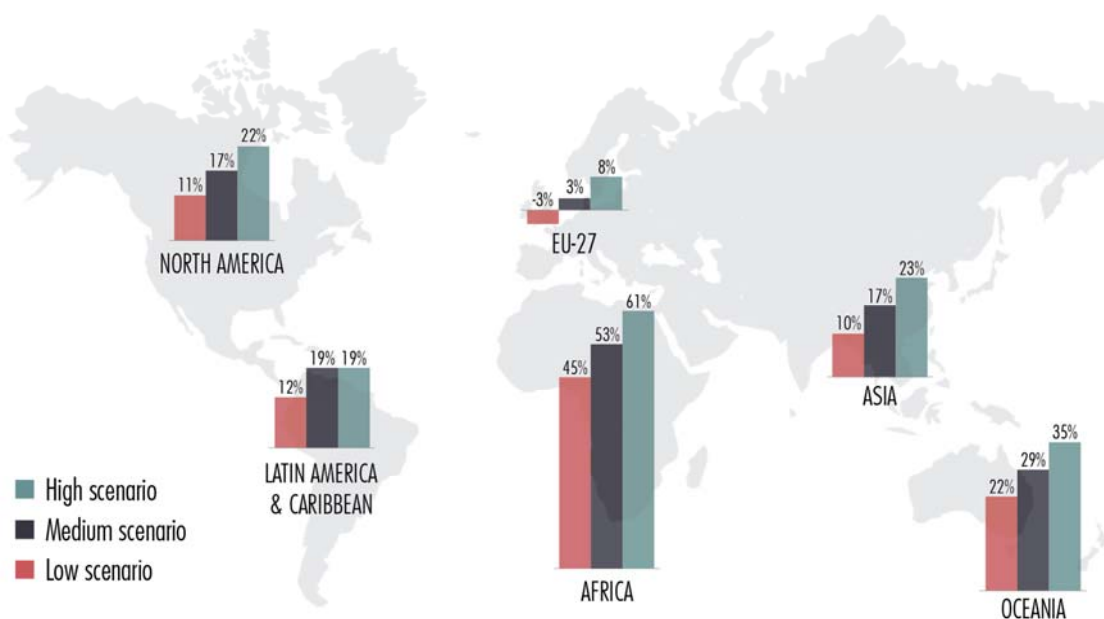
1.1. Population growth, driven by middle-income and low-income countries

Global population growth as a major demographic trend features prominently in various trend reports and is well documented and agreed upon in the literature as well as in projections. According to these various reports, world population will grow to between 8 billion and 9.6 billion by 2050 (United Nations, 2013). Population growth in 2030 in comparison to the population in 2010 is foreseen as exceeding 15% for most world regions across different scenarios except in the EU-27, where the population in 2030 could be around 5% lower than the population in 2010, according to the United Nations' lower variant – see Figure B.1.1 (Bongaarts & Bulatao 2000; EUISS 2012). Most forecasts suggest that overall population growth is likely to be driven by population increases in countries traditionally labelled as the 'developing world' – namely middle-income and low-income countries – via a process of demographic transition, by which a country experiences accelerated population growth owing to a decline in mortality rates that precedes a decline in birth rates, thereby creating a temporary surplus of births over deaths that results in a peak in the young population aged 15–24 over the long term (Birks 2007: 39; Chief of Force Development 2009; UN 2013).¹ Long-term UN forecasts (medium fertility scenario) estimate that the population of Africa will more than double from 1 billion today to 2.5 billion around 2050. Depending on the situation in the African continent then, this may generate a number of policy challenges for Europe in terms of migration (of both high- and low-skilled individuals).

¹ To avoid using debated concepts to distinguish between groups of countries according to their wealth, the terminology used in this report is broadly in line with that used by the World Bank and other international organisations (World Bank 2012). Instead of speaking of the 'developing' and 'developed' world, countries will mostly be designated as:

- 'High-income countries': the 'Western' world (Europe, North America and South Asia).
- 'Middle-income' or 'low-income' countries: what are commonly labelled the 'developing' world; that is countries defined here as those which have a lower per capita gross domestic product (GDP) and life expectancy than 'Western' states – in line with measures commonly used by international organisations, and which are often clustered in South Asia, Sub-Saharan Africa and the Middle East.

Figure B.1.1: Population growth in 2030 compared to population in 2010



Source: United Nations, Department of Economic and Social Affairs, Population Division (2010), World Population Prospects: The 2010 Revision, POP/DB/WPP/Rev.2010/02/F01

1.1.1. Drivers of population growth in the developing world: high fertility and declining mortality

The three main drivers underpinning population growth in middle- and low-income countries are (i) unwanted childbearing resulting from declining mortality (given improved health and sanitation standards) while fertility rates remain high; (ii) population momentum² – since the absolute number of individuals being born would still exceed the number of people dying (World Bank 2001); and (iii) high ‘ideal’ family size in developing countries (Bongaarts 2001).

Rapid population growth in the poorest countries is caused by declining mortality rates and continuous high fertility. The observed level of fertility in a population (often measured as the total fertility rate) is affected by the desired fertility among individuals, the availability of birth-control measures and family-planning policies to implement these preferences. Mortality, often expressed in life expectancy at birth, is affected by medical advances, general improvements in living and sanitation standards, and the prevalence of epidemics (Bongaarts 2009a; Bongaarts 2009b).

² The term ‘population momentum’ designates natural population growth which would occur even if fertility rates declined to replacement levels. Replacement levels are levels of fertility (average number of children per woman) needed for current generations to replace themselves when they die; the replacement level fertility rate is 2.1 children per woman.

1.2. Sources of uncertainty about demographic change

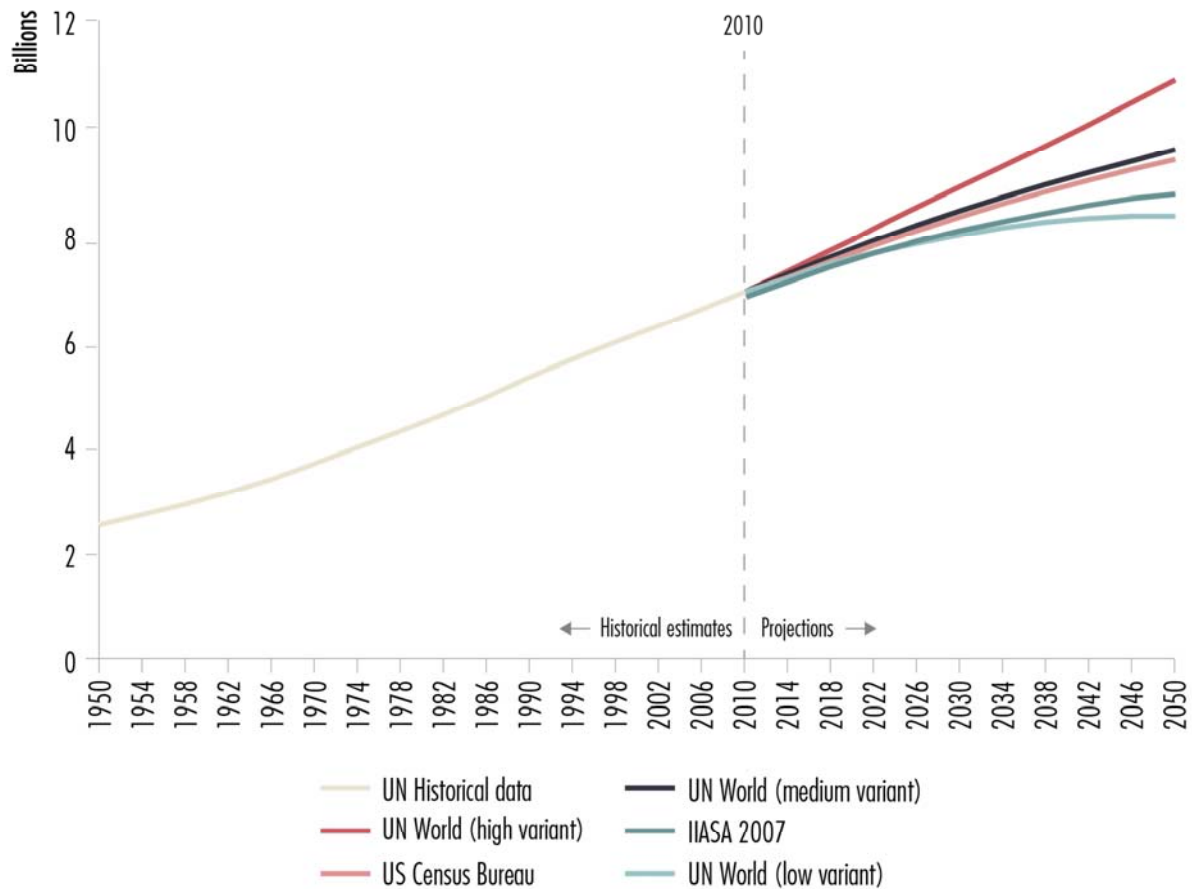
1.2.1. Uncertainties about the demographic dividend

It is often argued that rapid population growth may result in negative effects and lead to a slower pace of development in middle-income and low-income countries, yet there the literature does not concur on the nature of the outcomes resulting from population growth. However, rapid fertility declines may reverse this effect and increase the rate of economic growth in these countries via a demographic dividend. As birth rates decline, the number of young people declines as well. As a result the relative size of the labour force increases, and the dependency ratios (the ratio of the population aged 65 and above and under 18 to the working-age population aged 15–64 required to support them) declines, boosting overall wealth generation. The positive outcomes would only come about if the right policies and structures are in place, namely a well-educated labour force, an economic and social policy framework, and employment opportunities (EUISS 2012; Ministry of Defence 2010). By contrast, failure to provide employment to the increasing share of the young population may lead to greater instability, unrest and political turmoil in middle-income and low-income states (African Development Bank 2011; Bloom, Canning and Sevilla, 2003). Such events may create a ripple effect and influence the security of these states, and also migration flows or even production emanating from these countries in worst-case scenarios.

1.2.2. Uncertainties about the extent of population growth

Some level of uncertainty remains about the magnitude of population growth. This is owing to variations in the assumptions that underpin population projections. Experts frequently emphasise that the assumptions – for instance, on fertility, mortality or life expectancy – made by international organisations such as the United Nations to derive projections are not based on firm theoretical bases, but rather on observed empirical regularities, particularly in countries which have completed their demographic transition (Bongaarts 2009a; Duncan & Wilson 2004; Lutz & KC 2010; O'Neill et al. 2001). On average, the absolute error in population projections averages about 5% in 5-year projections, but reaches 17% for 30-year projections; forecasters assert that they can try only to define a likely range of uncertainty, or possible futures (see Beets 2010; Lutz 2007). Finally, scholars point out that although the end results of major population forecasts seem to concur (despite variation in initial assumptions) owing to similarities in the methods used, ‘consensus should not be taken as grounds for confidence in the results of the projections’ – see Figure B.1.2 (Cohen 2002: 86).

Figure B.1.2: World population projections from various agencies (in billions)



Source: Source: United Nations, Department of Economic and Social Affairs, Population Division (2013), World Population Prospects: The 2012 Revision, POP/DB/WPP/Rev.2012/POP/F01-1; US Census Bureau (2012), International Data Base: Total Midyear Population for the World: 1950-2050; IIASA (2007)

Two debated major demographic uncertainties over the next 50 years are international migration and the size of households and structure of families (Cohen 2003). The changing living arrangements of populations, particularly in Europe, are linked to demographic transformations, which have taken place rapidly over the past decades. Evidence suggests that a growing proportion of Europeans remain childless, parenthood seems to begin at a later average age than before, divorce rates are on the rise and marriages appear to be less stable; meanwhile cohabitation without marriage is increasing, along with single-parent households and step-parenting. All these factors are changing the living arrangements of Europeans. For instance, parenthood is starting at a later average age, and a growing proportion of men and women are remaining childless.

The forecasts of the Organization for Economic Cooperation and Development (OECD) and the European Commission converge in projecting that between 2030 and 2100 Europe and OECD states will witness a rise in single-adult households (Lelkes & Zólyomi 2008), driven by the development of education and reductions in housing constraints; an increase in single-parent families (also at risk of poverty); and a rising number of childless couples as well as a decline in average household size (OECD

2012c). Yet, there is considerable uncertainty surrounding the future of family sizes (Billari 2005; European Commission 2012b; OECD 2012c).

Chapter 2. Population ageing in the West, followed by the rest of the world

The second major demographic trend analysed in the literature is that Europe, North America and Eastern Asia and other high-income countries face a greying population in the short to mid-term. The phenomenon is well documented in the literature, and is likely to be made manifest in four ways: a higher absolute number of elderly citizens, longer healthy life expectancies, a larger share of the elderly population, and fewer numbers of working-age individuals (Anderson & Hussey 2000; Bloom et al. 2011). The United Nations project that in high-income countries, the number of individuals aged 60 and above will rise from 245 million in 2005 to 406 million in 2050; by 2030, one in eight people worldwide will be 65 or above (Beard et al. 2011; Chief of Force Development 2009).

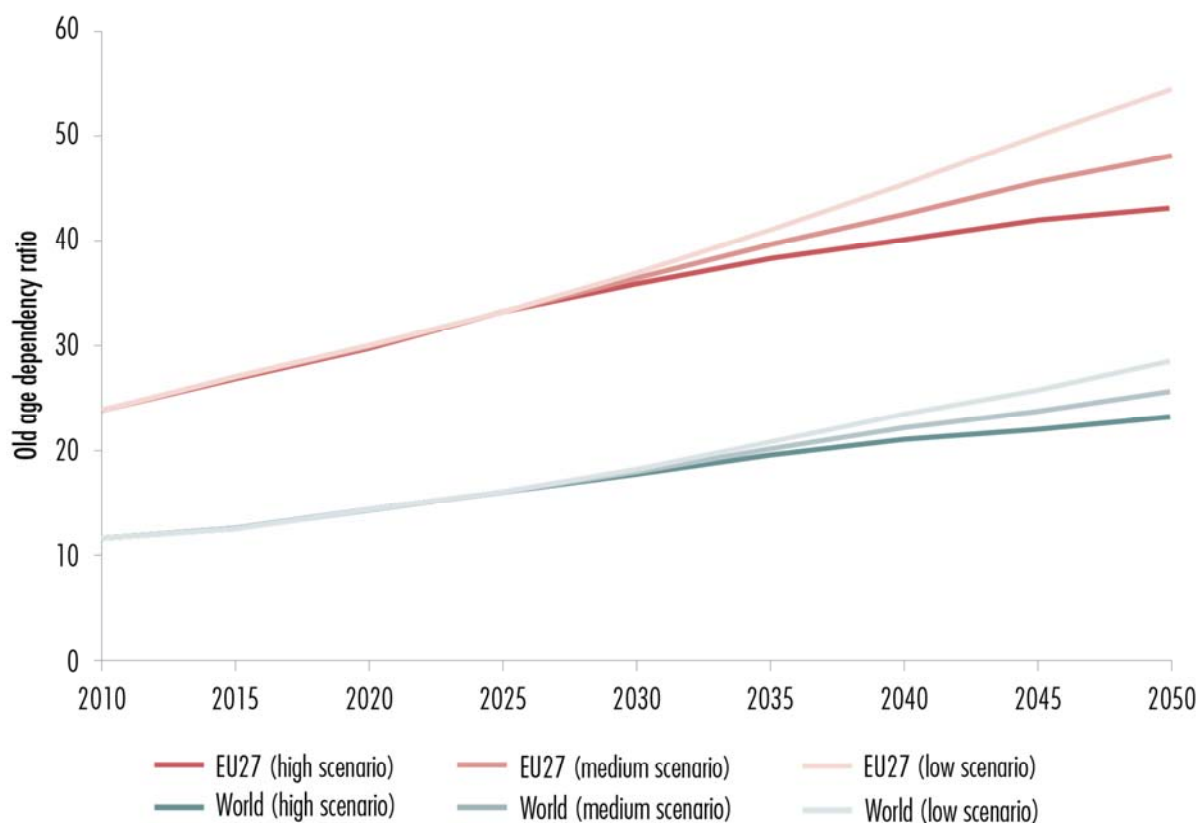
Other UN projections expect a 10-year increase in the median age of the world population by 2050 to 36 years old. Owing to ageing populations worldwide, the old-age dependency ratio is set to rise in the EU-27 more than in the world as a whole over the next 25 years (see Figure B.2.1) (Birks 2007; UN 2001).

In the long term, forecasts and experts posit that, eventually, population ageing will affect ‘younger’ regions such as Latin America and emerging countries, and that by 2050 developing countries will be ageing as fast as the West is now (EEA 2011; Jackson et al. 2009). In the long term, the number of ‘youthful’ states – where the median age is less than 25 – is set to decrease while the number of ‘mature’ countries (where the median age is 35–45) and ‘post-mature’ countries (median age of 45 and above) will increase as steeply declining fertility rates push the median age of the population up (National Intelligence Council, 2012). The key challenge for middle-income and low-incomes countries will be to reap the benefits of a young workforce before facing the burdens (notably on pensions) of a growing number of elderly citizens; in other words, the challenge for such states is to ‘get rich’ before ‘getting old’ (Bloom, Canning and Fink 2011). Evidence from the Delphi exercise indicates that the likelihood that fertility rates in middle-income countries (such as Brazil, India and China) will fall below the replacement rate (of 2.1 children per woman) by 2030 is fairly high (around 70% in the third round of the Delphi).³ There was some disagreement among experts, and about 25% of respondents thought it was much higher (80–90%). Experts pointed out that there is a trend towards more educated women, which means it is possible that fertility rates will follow the same trajectory as in developed countries and reach levels below

³ Unless otherwise stated, all results of the Delphi exercise cited in this report are derived from round 3 of the Delphi.

replacement. At the same time, interviewees highlighted that ageing would not have the same impact on all states, and is not occurring at the same pace. Even within Europe, they suggested that demographic problems may be more acute in new Member States and Baltic states where demographic growth is negative in biological terms, yet high numbers of citizens migrate to other countries, leaving unfulfilled needs in the sending state. A first milestone for Europe is likely to be reached around the 2020s, when a high increase in the proportion of people aged 65 and over takes place. Another milestone may be reached in 2060 as the old-age dependency ratio reaches levels whereby there is more than one elderly citizen for every two working-age individuals (Lanzieri 2011). Since 2010, the baby-boom generation has begun to retire, and some forecasts project that as a result the old-age dependency ratio – the ratio of those aged 65 and over to the number of individuals aged 15 to 64 – will reach nearly 50% in the EU-27 by 2050, thereby sharply increasing strain on public systems (Brooks 2003).

Figure B.2.1: Old-age dependency ratio across selected world regions, 1950-2100



Source: United Nations, Department of Economic and Social Affairs, Population Division (2010), World Population Prospects: The 2010 Revision, POP/DB/WPP/Rev.2010/02/FO5-3A

2.1. Population ageing is occurring thanks to the interaction of several drivers

The factors driving future population ageing in the West and worldwide are manifold. In North America and Europe, the general increase in the number of elderly individuals is partly due to the ageing of the baby-boom generation. Middle-income and low-income countries will see their median age rise, and are likely to face a pensioner bulge in the long term.

The two most important drivers underpinning ageing as a long-range trend are increased life expectancy and declining fertility rates, which remain well below the replacement rate in many European states. Drivers for both of these are examined in turn below.

2.1.1. Increases in life expectancy as a major driver of ageing

In the past, increases in life expectancy were due to reductions in non-senescent deaths and mortality at younger ages caused by infections or epidemics, thanks to the development of antibiotics and the spread of vaccines (Bongaarts 2009b). Currently, most changes in life expectancy occur because of changes in senescent mortality, namely the effect of ageing, which can be postponed by medical intervention (Bongaarts 2009b; Jackson et al. 2008).

2.1.2. Declining fertility: a complex and multifaceted driver

Declining fertility rates are a result of several combined factors, namely economic development and industrialisation (rising wealth, improvements in material conditions, healthcare, lifestyles and wider availability of birth-control measures), changes in values (reduced demand for children, shifting priorities), and higher education and employment rates, particularly for women.

Little is understood about the extent of the interaction between the factors contributing to declining fertility levels, and these interactions differ between high-income countries and middle-income and low-income states. In short, some experts argue that increased educational attainment for women in middle-income and low-income countries is likely to reduce unwanted childbearing (owing to greater access to contraceptives) and to postpone childbearing as a whole as women enter the labour market and have access to a career (Lutz & KC 2011). This process is expected to contribute to economic growth – given increases in the workforce (Beets 2010; UNPD 2002). The evidence shows that in the developing world, women with higher education levels have fewer children than those with low education levels, and that their children have lower mortality rates and higher survival rates (Lutz & KC 2011).

At the same time, the large-scale entry of women into the labour force in middle- and low-income countries will contribute to raising the opportunity costs of having and raising children, as individuals prioritise their career and delay childbearing, especially as globalisation increases competition for work and hinders stability (Jackson et al. 2008; Lutz 2007). Experts claim that the resulting empowerment of women and growing wealth are likely to lead to changes in values that will affect fertility rates in several ways. Firstly, the rise of a global middle class may favour a new middle-class ethos emphasising the ‘quality’ rather than the ‘quantity’ of children, and give rise to new cultural attitudes such as individualism and independence (Birks 2007). The rise in such values will be partly linked to decisions about smaller family sizes in affluent societies, owing to some extent to competing decisions about the consumption of goods (Becker & Gregg Lewis 1974; European Commission 2012b; Jackson et al. 2008).

Fertility decline in Europe is also driven by a complex range of factors; women’s increased enrolment in education and access to the labour market appear to have affected demographic behaviour by leading to greater birth postponement (the effect is known as the ‘tempo effect’) because more highly educated individuals tend to delay childbearing. This is partly because they prioritise their careers, and a dual earner model has developed whereby women are becoming breadwinners instead of caregivers (Gustafsson & Worku 2005; Lappegård & Rønsen 2005; Sobotka 2004; van Bavel 2010). Evidence for the link between higher education levels for women and lower fertility in Europe is mixed. The association appears to hold to an extent in the United Kingdom and in Germany, but it is weaker in other European countries such as the Nordic states and France (Andersson et al. 2009; Ekert-Jaffé et al. 2002; Sigle-Rushton 2008). The correlation between women’s labour force participation and fertility was negative in Europe until the 1980s, yet the correlation slowly weakened or even reversed in many countries when the perception of women’s participation in labour markets and work–life balance family policies changed (Kotowska 2012).

In accordance with the theory that higher education levels and labour force participation tend to delay childbirth, the mean age of couples at the birth of the first child has steadily risen across Europe over the past few decades, while the gap between desired and actual fertility at specific ages has also increased (Rita

Testa 2012; van Bavel 2010; van Bavel 2011). The trend to postpone marriage, childbearing and family formation is forecast to continue over the coming years, affecting fertility rates and overall population ageing in Europe (Billari 2005; European Commission 2010; Rubery, Smith and Fagan, 1999; Sobotka 2011). Recent evidence also suggests that the economic crisis and resulting increases in youth unemployment rates correlate with lower reported desired fertility (Rita Testa & Basten 2012). It is also suggested that the crisis may have affected European fertility levels, which have now stopped their recent recovery and stabilised at around 1.6 children per woman in the EU-27, which remains below replacement levels (DG EMPL 2013).

2.2. High levels of uncertainty and debate on the drivers underpinning ageing

The evidence base for drivers of population ageing is peppered with scholarly debate and uncertainty around its drivers and effects. The debate revolves chiefly around future trends in fertility rates, as there is less uncertainty about increases in life expectancy. Data from the interviews lend themselves to identifying caveats to the levels of uncertainty in fertility and mortality; it was argued that the horizon of 2030 is short, and that children born today will not even have entered the labour market nor had an impact on pension or dependency ratios by then.

2.2.1. Debates on the expected rise in life expectancy

The evidence base is consistent in pointing to an increase in the life expectancy that humankind can expect to achieve. There is some debate about the pace of expansion, however, which in turn affects projections of future population structures (Coleman 2006). Whereas in the past experts believed that life expectancy in the developed world was reaching a ceiling, and that human beings had a characteristic life span, such expectations have been proved wrong over the past ten years. Experts have come to embrace the notion that there is still scope for life expectancy to improve, partly since the best-performance life expectancy has increased by about three months per year over the past 160 years (Jackson et al. 2008; Oeppen & Vaupel 2002).

Those defending the theory of a continued rise in life expectancy point out that if life expectancy were close to its maximum, the increase in best-performance life expectancy should slow down, but this has not been the case (Oeppen & Vaupel 2002). Participants in the Delphi estimated the likelihood of a rise in the average life expectancy at birth in high-income countries without a ceiling, horizon 2030, was around 75% – about 10% higher than in the initial estimate provided in round 1 of the Delphi exercise. There was some (albeit little) disagreement among experts; about 10% of experts thought the likelihood was below 50%. The difference in results across rounds may be accounted for by the debates taking place in the second round of the exercise since a range of mitigating factors were discussed, including the health status of current generations (which are less healthy than previous younger generations, owing partly to increases in obesity and unhealthy behaviours, etc.). Experts also pointed out that increases in best-performance life expectancy were not equivalent to the probability of the whole of mankind reaching such life expectancies in the future. Finally, participants' forecasts of the average life expectancy for males and females in the EU-27 were in line with Eurostat's projections (namely 79 years as opposed to 75 currently

for men, and 85 years, compared to 82 now for women). High levels of agreement indicate the likelihood that life expectancy in Europe will continue to grow steadily.

The crux of scholarly debate on rising life expectancy is the extent to which morbidity is clustered among a certain age group, or period of the life cycle. Further improvements in health would have to occur at higher ages to keep maintain higher life expectancies, yet morbidity seems to be clustered among the old, and the rise of unhealthy lifestyles has led to a rise in chronic, non-communicable diseases (NCDs) which are resistant to cure. This may have a significant impact on the welfare systems of European states in particular over the coming decades (Beets 2010; Jackson et al. 2008). The effects of the global burden of diseases on life expectancy are unclear. The proportion of deaths due to non-communicable diseases (heart, pulmonary, etc.) is set to rise to 69% globally by 2030, compared to 59% in 2002. Delphi experts appeared to confirm the notion that epidemics may not have a major effect on populations by estimating that the likelihood that prevalence of NCDs would offset increases in average life expectancy in high-income countries over the next 20 years is low (about 35%), and after the discussion the average likelihood declined marginally. Participants hinted that NCDs may create challenges for the populations and welfare states of emerging economies, and rated the likelihood that increased prevalence of NCDs in middle-income countries (such as Brazil, India and China) would lead to more than a 5 percentage point increase of GDP in public healthcare expenditure – to 50%. There was some level of disagreement; a roughly equal proportion of participants (about 10%) rated the likelihood to be 10–20%, 40–50% and 70–80%.

The literature does not seem to agree on a theory that could account for changes in life expectancy. Several theories seem to prevail, namely the dynamic equilibrium / postponement of morbidity theory (by which health life expectancy grows at a similar rate to overall life expectancy); the expansion of morbidity thesis (which states that the pattern of diseases remains constant, but that longevity is achieved by greater medical capacity to reduce death from degenerative diseases); and the compression of morbidity theory, which assumes individuals will live longer as the onset of degenerative and non-communicable diseases is postponed to a later, smaller share of the life cycle (Przywara 2010). If it were to materialise, compressed morbidity would enable individuals to work for longer and might relieve the pressure on welfare and healthcare systems. Yet, if the expansion of morbidity thesis materialised, a significant burden to the healthcare systems of high-income, and then middle-income and low-income, states should be expected (Bloom, Canning and Fink, 2011). The extent to which likely poor health towards the end of an individual's life and healthier life expectancies will counterbalance when it comes to rising demand for healthcare and costs of healthcare is a major unknown (Bloom et al. 2011). During the Delphi, the reliance on medical technology was questioned; a few experts indicated that, if these technologies only manage diseases without curing them, it is possible that individuals would accumulate morbidities requiring medical treatment through drugs, which might in turn destabilise their homeostatic balance and make it harder in the long term to ward off NCDs.

2.2.2. Fertility levels: inconclusive evidence?

A wealth of factors contribute to uncertainty around fertility levels, such as choices in reproductive health, policy choices facilitating women's education and entry in the labour market (Cohen 2002). The extent to

which fertility levels will remain low in wealthier countries is debated. Some suggest that over the past few years highly developed countries (as measured by Human Development Index scores above 0.86) with high gender equality levels (as measured by the Global Gender Gap index) have seen a trend reversal in fertility declines (Myrskylä, Kohler and Billari, 2011).

Overall, several projections from agencies such as the United Nations and the International Institute for Applied Systems Analysis (IIASA) assume that Total Fertility Rates will stabilise or rise in the long term in countries with the lowest levels, and ‘no agency assumes continued fertility decline in the main scenario’ (Lutz 2007: 19). Yet, a significant majority of experts taking part in the Delphi exercise highlighted that the likelihood that fertility rates in the EU would rise to reach above-replacement rates (e.g. more than 2.1 children per woman) in 2030 was extremely low (below 10%). There was relatively little disagreement on this issue throughout the exercise, with all expert estimates being below 30% in round 3.

Another area of uncertainty in the literature regarding fertility levels, particularly in Europe, is whether policy interventions could be effective in raising very low fertility. Such interventions include, alongside a broader set of socio-economic policies, benefits to large families, housing subsidies, family-focused policies to support new parents and improved parental leave (Billari 2005). Evidence shows that fertility is to an extent linked to the provision of childcare (European Commission & Eurostat 2011). However, given the complex range of factors which influence family formation decisions, policies designed to facilitate work–life balance and encourage greater fertility appear to have only a limited effect, unless they have been in place for extended periods of time (Lutz 2007). An assessment of the impact of various policies on fertility (leave and childcare provisions, financial incentives, work–life balance, gender equality and infertility treatments) is provided by Hoorens et al. (2011); their study concludes that the effects of policy are small and debated, and that analysing these effects causally is arduous, given their interrelated nature.

Research shows that policies designed to raise fertility have had varying success in European states, although in Sweden policies seem to have helped to reduce childbirth postponement for highly educated individuals by facilitating the combination of work and family life, notably through paid and protected parental leave, which helps households adapt working arrangements without loss of income (Anxo et al. 2007; Birks 2007; Gustafsson & Worku 2005).

Discussions on the impact of population ageing in Europe and elsewhere focus on the negative effects of population ageing, notably in terms of healthcare costs, which are discussed in the Synthesis Report of the work on societal trends conducted as part of the ESPAS project (Christensen et al. 2009; Hoorens et al., 2013). Growing healthcare challenges may also occur in middle-income and low-income countries, where worst-case scenarios include the burden of high healthcare expenditures owing to high incidence of infectious diseases (if vaccination coverage is low) and a rise in chronic NCDs owing to population ageing (World Economic Forum 2008).

Matrix for key trends in demography

Trend	Drivers	Indicators	Evidence-base (0/+/++/+++)	Time horizon	Outcomes for the EU	Uncertainty (low/ medium/ high)
Global population growth (driven by middle-income and lower-income countries)	High fertility in developing world, declining mortality (due to medical improvements), empowerment of women and changing values	Fertility rates, life expectancy at birth, 'ideal' family size across various countries	+++	Medium to long (10–50 years)	Global strain on natural resources and food supplies, migration flows	Low
Population ageing in high- and middle-income countries	Increased life expectancy, declining fertility (owing to economic, developmental and value-related factors)	Old-age dependency ratio, average life expectancy, healthcare costs as a proportion of GDP	+++	Short to long (5–50 years)	Financing welfare state models with a shrinking workforce, managing healthcare and pension costs, challenges in provision of services (e.g. elderly care)	Low
Changing family structures and sizes in Europe	Increase in number of elderly citizens, increase in single-person and single-parent households, changing family formation patterns (cohabitation, etc.)	Proportion of single-parent households, average household sizes, divorce rates, at-risk-of-poverty rates by household type	++	Short to medium (5–10 years)	Ensuring adequate housing supply, adaptation of family support systems, managing risk of poverty and social exclusion	Medium
A youth bulge in parts of the developing world	Past high fertility rates in the developing world, improving maternal and neonatal health, improved sanitation, declining under-5 mortality, declining	Total fertility rate, birth rate, neonatal/child/under-5 mortality rate, proportion of 15–24, total population, number of hospitals per 1,000 capita,	+++	Long term	Effects of population growth on migration flows to the EU, possible societal unrest or pressure for democratic reform, potential sources of radicalisation.	Low

Trend	Drivers	Indicators	Evidence-base (0/+/+/+/+/+)	Time horizon	Outcomes for the EU	Uncertainty (low/ medium/ high)
	prevalence of infectious diseases.	prevalence rates of infectious diseases (diarrhoea, malaria, etc.)				

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