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MEGATRENDS AND SOCIAL SECURITY

# Demographic changes

MEGATRENDS SERIES

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# Foreword

This report, the fourth and last in an ISSA series seeking to assist members in anticipating and reacting to megatrends, summarizes selected demographic trends likely to have significant future impacts on social security institutions. It builds on important work completed by the Association on demographic trends and proactive and preventive approaches during previous trienniums, and contributes to the new ISSA focus on the "ten global challenges" facing social security identified at the ISSA World Social Security Forum 2016.

Social security exists to respond to life-cycle risks. Demographic changes directly affect the nature of these risks and the ability of institutions to respond effectively to them in the benefits and services they provide.

As for the other megatrends studied previously, the report highlights the fact that social security administrations can often both mitigate and influence positively the impacts of future demographic evolution. This report assists institutions by anticipating and predicting future trends, analysing their impact on social security systems and considers the measures with which to respond. It thereby provides useful support to other measures put in place by governments and policy-makers in a rapidly changing world.

Anticipating and reacting to the external environment in which social security operates is a crucial part of what social security institutions are and should be doing. Evidence suggests that the greater degree to which institutions can prepare for the likely impacts of these trends, the better and more efficient will be their responses.

The scope of the report is wide and the aim, on the one hand, is to focus on those trends most likely to impact social security institutions and, on the other hand, to focus on nascent trends that are subject to significant levels of uncertainty.

# Contents

# Executive summary

This fourth ISSA report on selected megatrends focuses on key future demographic changes and their likely impacts on social security systems. The aim of this report – like all reports in this series – is to highlight and analyse unexpected, emerging and uncertain trends ahead and to identify possible discontinuities from previous trends. The report is not exhaustive; instead, it focuses on trends likely to have the greatest impact on social security systems and which will be the most challenging to address. This report follows on from other ISSA work on demographic changes including that carried out in the triennium 2008–2010 that culminated in a series of reports presented at the World Social Security Forum in 2010.

Although the aim is to identify global and regional trends, there are often significant variations across and even within countries. The report therefore does not attempt to accurately predict and project future trends everywhere, but its objective is rather to highlight those possible and probable developments that are likely to affect significantly social security systems.

A key aspect of the report is to ask how social security systems can respond to demographic changes in ways that are effective and efficient. In this regard, institutions and policy-makers should be able to anticipate and assess how trends are likely to develop and what their impacts will be. This report seeks to assist social security administrations and policy-makers in doing this.

The report consists of three chapters. The first chapter identifies key future trends affecting mortality and morbidity outcomes. Initially, it provides a global demographic snapshot with a summary of recent trends and offers the identification of key selected future trends and the factors underlying these. It then discusses regional variations in trends. Finally, the discussion considers the importance of predicting these trends – and the mechanisms employed to do so – so that institutions can better appreciate their impacts. An appreciation of the factors behind demographic trends and their evolution is vital if social security institutions are to effectively anticipate and mitigate these. The second chapter seeks to identify how such future changes can be estimated, anticipated and projected in the most appropriate and realistic way. This is essential, as it is not only the mid-range projections that are important, but also the variation of outcomes, sensitivity and the experience in the "tails" of future mortality and morbidity distributions. Producing projections that are as accurate as possible clearly assists administrations to better plan and anticipate the future demands on social security systems and how responses to these can best be delivered. However, such projections need to be straightforward to interpret and understand, and an explanation given regarding the sensitivity of outcomes to changes in the underlying factors. The report therefore sets out the importance of properly defining the variables to be assessed, the management of data to be used in the process, the role of actuaries, demographers, health experts and statisticians in the process and, finally, how to take into account regional and socio-economic variations. It is underscored that social security administrations need to manage such a process effectively to ensure that future changes are anticipated and managed. The third chapter highlights the challenges and responses of social security systems to these trends. It explores, for example, how systems can adapt to those population groups whose mortality and morbidity rates are not improving, while, at the same, ensuring that retirement and medical systems are sustainable given overall life expectancy improvements.

## Key findings

A major global demographic trend is population ageing. As the WHO notes, "[f]or the first time in history, most people can expect to live into their 60s and beyond. The consequences for health, health systems, their workforce and budgets are profound" (WHO, 2015a). The global population continues to age. Nevertheless, the extent and nature of ageing is uneven. Moreover, the extra years of life gained are not all lived in good health. At the same time, the nature of the health challenges facing social security systems is changing. The achievement of social security systems' objectives may be at risk if these challenges are not correctly anticipated and appropriate measures taken; therefore, benefit and service design and delivery must be appropriate in this new environment. Arguably, the biggest challenge is in countries with relatively under-developed social security systems but which are already ageing quickly; here the focus will be on covering the population without any or with limited social protection.

Social security institutions should play an ever-increasing role in mitigating the negative impacts of the changes that lie ahead and a number of examples demonstrate that this is already happening. However, ageing in itself is not a negative development – a more mature population is not per se a "burden" on society given that many people are able and willing to work for longer than was the case for previous cohorts, or to contribute in other ways to society. Therefore, while improved longevity directly affects retirement system costs, the effect of ageing on health system expenses is more complex as it can be influenced proactively by effective preventive measures. In addition, given that the older population plays active roles in both the formal and informal economy (e.g. providing care), the challenge for social security systems is to reflect this reality in the broader context of enabling older cohorts to participate actively in society. This can be done by putting in place effective active ageing policies, for example, which supports other measures improving the financial sustainability of social security schemes. However, while improved health and safety measures can support later retirement ages, as the OECD reports, "even with the best of efforts, working longer is not an option for everybody; some people will need to retire early due to job strain and declining health no matter how high the pension age is set" (OECD, 2016b). This requires, when justified, a differentiation in the approaches to different groups of the population.

People are in general living longer and, for many, in overall better health than was the case for previous generations. However, in reality this global picture hides an increasing variation of experiences. Inequality of outcomes and unhealthy life expectancy are the two key "hidden" elements of this broader picture. The trend of increasing inequality in mortality – which sees the wealthier living longer and in better health while those in lower socio-economic groups see a stagnation or fall in life expectancy – is likely to continue unless more effective strategies on how to remove the causes of such inequality are developed. As the World Health Organization reports, "strategies must look not to just improve conditions for the best off or average older person" (WHO, 2015a). While increasing longevity has been the focus of numerous discussions on intergenerational equity, the intra-generational equity aspects of such changes have not always been addressed. In particular, it means that measures taken – for example, higher retirement ages – have sometimes addressed the former, but have not necessarily always assessed the impact on the latter. As the OECD state, "policies encouraging people to work longer following the average increases in life expectancy may therefore disproportionately penalise individuals in lower socio-economic groups who would be working longer but not necessarily living longer" (OECD, 2016a).

An analysis of underlying trends suggests that the future outcomes of improvements in mortality may not be as great as in the past or, at least, that future improvements will not be as rapid as previously experienced. One of the reasons is a significant shift in the causes of death over recent decades, with a growing number due to non-communicable diseases such as diabetes and mental health issues; these in turn have significant financing implications for long-term care and health care systems. Such a shift indicates that the previous levels of improvements in mortality may not be repeated in the future, because comparable reductions in deaths from the new emerging causes may not be achieved easily. Healthy life expectancy is not increasing at the same rate as life expectancy. Thus, there should be more focus on the morbidity implications of this new reality.

The report considers in detail future changes in health and the impact on social security systems. The relative shift in disability cases from those assessed with a physical condition to a mental condition will continue, with the increasing number of cases assessed at a younger age and among women requiring more tailored approaches. The increased incidence of non-communicable diseases – particularly costly for society because of direct (e.g. treatment) and indirect (e.g. loss productivity, informal carer opportunity) costs – and multi-morbidity (a simultaneous occurrence of different health conditions) raise new challenges for society in general and social security systems in particular. Non-communicable diseases mostly affecting elderly populations and mental disorders mostly affecting younger populations both represent large burdens on health care and the economy that are projected to increase in the future. Addressing these will be essential in mitigating social security risks and needs worldwide. These future developments will have significant financial and organizational implications for social security systems given that a main driver of total medical and disability costs tends to be the 20 per cent of population with the worst health status.

The other reason for an ageing population – the fall in birth rates – has financing implications but will also impact directly social security policy and benefits (family allowances, maternity benefits, etc.) as well as influencing wages, education and migration policy responses. Though falling birth rates and increasing old-age dependency ratios clearly raise financing issues, high birth rates and expanding populations are also challenging to manage (for example, education needs in the short term and resource sustainability issues in the long term) as well as increasing the overall dependency ratio in the short run.

The report considers the cases of a number of countries seeking to manage a transitory "demographic dividend" followed by a relatively rapid ageing of their populations and highlights the inherent challenges.

This report touches on the issue of internal and international migration because population size and profile depend heavily on the size and characteristics of such flows. Responses to migration are not covered explicitly in this report as the ISSA has covered these elsewhere (ISSA, 2014a). Importantly however, facilitating migrant flows may help some countries respond to population ageing in the short and medium term, but the effect is likely to be marginal and in the long-run have less clear cut impacts on financing.

Social security administrations and policy-makers can use a number of measures to mitigate and adapt to the more challenging impacts of demographic changes that also support the more positive outcomes of such changes. Examples featured in the report are of earlier interventions and an economic analysis of the costs and benefits of such ex ante measures. In addition, the report highlights the need to work

with other stakeholders such as employers to develop and reinforce measures to support older workers in employment. While much of the debate about appropriate responses focuses around parametric reforms, it is likely that we will also witness structural reforms to systems involving changes to their design, financing and delivery and an evolution of the roles of different stakeholders. Concepts of individual and societal well-being will evolve and provide the framework for revised objectives and the policy and delivery choices required to meet them.

One of the challenges in analysing potential responses to meet future demographic changes is that the past is arguably not a particularly good guide to the future – both in the trends observed and in the measures taken. Changes and reforms made in the past may have been relatively more straightforward to put in place than will be the case in the future. Moving from a dependency ratio of 8 to 4 may make the financing burden for social security systems more challenging, but it is still deemed as "reasonable"; the challenges presented by the ratio moving from 4 to 2 are significantly greater. It is particularly challenging when longer life expectancy brings with it increasing health care costs. It is for that reason that this report seeks to "look forward" rather than analysing past trends and reforms, although these should also be considered to judge what might work going forward. In addition, inequalities in outcomes have increased. Therefore, though people may be healthier on average, health inequalities are likely to mean that total costs will increase given the concentration of health care costs in treating a small proportion of the population. In addition, these changes are taking place in the context of changes in other external factors – including changes in family structures, increasing precarization of labour markets and the impact of climate change and natural resources scarcity on economic growth. These are trends highlighted in two ISSA reports: *Labour market megatrends* (ISSA, 2013) and *Climate change and natural resource scarcity* (ISSA, 2014b). Current pressures on public finance – for example, health spending in the European Union reduced by 0.6 per cent per annum from 2009 to 2012(and remained flat in 2013) compared to an average increase of 4.7 per cent per annum between 2000 and 2009(OECD, 2014a; 2015a) – is an important constraint. Financial realities mean that approaches will need to focus more on preventive measures, which reduce life-cycle risks as well as changing the nature of benefits and services, developing appropriate administration and communication measures, and adopting a holistic approach that considers all benefit provision.

Responding to the increasing challenges and global burden of non-communicable diseases requires a multi-sector response, involving policy and system adaptation, incorporating preventive and curative treatment components, and including mental health. Proactive efforts are likely to have incrementally greater impact because these diseases and their risk factors are highly amenable to early intervention, before complications (and even symptoms) manifest. This is especially important in low resource settings, given that prevention is often cheaper and simpler than the management of protracted and complicated chronic diseases.

Within this context, a substantial rethink of the structure of social security – from the design, financing and delivery to the management and administration – may involve greater coordination between different branches of social security with an overview of the system, rather than the scheme, benefits, costs and delivery (i.e. across disability, unemployment, health and retirement systems). A focus on the "how" as well as on the "what" will be necessary – to increase service capacity and transform benefits will require the inputs of trained and qualified staff. Without an appropriately trained health workforce of sufficient size, for example, countries will be unable to realize accessible, affordable and quality universal health care, thus jeopardizing wider social development goals.

# 1. Trends and projections

Assia Billig, Philippa Boulle and Simon Brimblecombe

This chapter sets down, at a global level, recent fertility, mortality and morbidity trends as well as views on their future evolution. It describes the ageing of the world's population and analyses the factors behind it – an increase in life expectancy (at birth and at older ages) and a fall in the birth rate almost everywhere. However, variations in this reality are noted and sections 1.2 and 1.3 explore these in more detail.

## 1.1. Global trends

Globally, life expectancy continues to increase (Table 1.1). This trend is practically universal, but not uniform, across all countries, for both men and women. Life expectancy at birth has increased from 47 years in 1950 to over 70 years in 2015 and is projected to increase to 77 years for children born in 2050.[1]

Table 1.1 shows that the increase in life expectancy has been particularly dramatic in Asia, with a near 30-year increase over 60 years, and has been significant in Africa (more than 20 years).

All age groups have seen mortality improvements, but most markedly at the start and end of life. In less developed economies the reduction in infant mortality[2] has been a key driver in the increase in life expectancy (Table 1.2), with mortality for children younger than age 5 having reduced by over 50 per cent in low-income countries from 1990 to 2013 (WHO, 2015a).

**Table 1.1.** *Development of life expectancy from birth by region and sex over the last 60 years*

| Region | Male 1950–1955 | Female 1950–1955 | Male 2010–2015 | Female 2010–2015 |
|---|---|---|---|---|
| Africa | 36 | 39 | 58 | 61 |
| Asia | 41 | 43 | 70 | 74 |
| Europe | 61 | 66 | 73 | 80 |
| Latin American & the Caribbean | 50 | 53 | 71 | 78 |
| North America | 66 | 72 | 77 | 82 |
| Oceania | 58 | 63 | 75 | 80 |
| World | 45 | 48 | 68 | 73 |

*Source:* ESA (2013).

1. All data in chapter 1 are from ESA (2013); future figures are medium variants. Comments regarding the projections in this database are set out in Chapter 2.

2. The number of deaths of children younger than age 5 reduced from 12.7million in 1990 to 6.3 million in 2013; see WHO (2015b).

**Table 1.2.** *Trends in infant mortality (0 to 5 years) over the last 60 years*

| Major area, region, country or area | Crude death rate (deaths per 1,000 population) | |
|---|---|---|
| | 1950–1955 | 2010–2015 |
| WORLD | 19.2 | 7.8 |
| High-income countries | 10.7 | 9.0 |
| Middle-income countries | 22.7 | 7.4 |
| Upper-middle-income countries | 21.3 | 6.9 |
| Lower-middle-income countries | 24.2 | 7.8 |
| Low-income countries | 28.6 | 9.3 |

*Source:* ESA (2013).

In addition, maternal mortality has fallen by 44 per cent over the last 25 years, with the biggest fall in East Asia (a fall of 70 per cent).[3]

In high-income countries rising life expectancy for the population older than age 60 is the main driver of increasing life expectancy, as shown in Table 1.3.[4]

The increase in life expectancy is influenced by a number of factors, including improvements in health care, access to clean water (89 per cent of the population have access to improved drinking water sources compared to 76 per cent in 1990) (WHO, 2015a), improved hygiene, and a more reliable food supply and a fall in real food prices. While improvements in mortality have been striking at older ages, there is no evidence that the maximum life span has or is increasing.[5]

**Table 1.3.** *Trends in life expectancy at age 60 in the last 60 years*

| Major area, region, country or area | Life expectancy at age 60 for both sexes combined (years) | |
|---|---|---|
| | 1950–1955 | 2010–2015 |
| WORLD | 14.05 | 20.16 |
| Africa | 12.52 | 16.73 |
| Asia | 12.09 | 19.38 |
| Europe | 16.78 | 21.93 |
| Latin America and the Caribbean | 15.14 | 21.79 |
| Northern america | 17.43 | 23.47 |
| Oceania | 16.35 | 23.70 |

*Source:* ESA (2013).

3. See <http://www.who.int/mediacentre/news/releases/2015/maternal-mortality/en/>.
4. Over the period 1989 to 2009, 59 per cent of the increase in life expectancy for males (3.0 out of 5.1 years) came from mortality improvements (i.e. reductions in mortality rates) at age 65+. For females, the corresponding proportion is 67 per cent (2.0 out of 3.0 years) over the same period. See OCA (2014).
5. The record holders for both the world's oldest woman and man since 1955 both died last century.

Improvements at older ages have been quite striking, lately shifting to age 75 and older[6], particularly for developed economies with an increase of more than 3 years for Europe and the Americas and 2 years for Africa and Asia since 1960.[7] Despite medical research aimed at increasing longevity, living to 100 years on average is not realistically attainable. For example, for a Canadian to a have a calendar life expectancy of 100 years from birth would require either increasing the maximum life span to 140 years, reducing mortality rates at each age by about 90 per cent, or eliminating all deaths prior to age 97 (OCA, 2014).

While life expectancy has increased, birth rates have fallen across all regions, practically halving since 1950–1955, although the reduction varies by type of country with the biggest reductions observed in middle-income countries (Table 1.4).

The reduction in birth rates is due to a variety of social, economic and medical factors and include:

- better health services and lower infant mortality rates;
- increasing costs of raising and educating children (both direct, such as childcare, and indirect, such as a reduction in employment opportunities);
- increase in employment opportunities and improved education for women and changes in the perceived role of women in society (including anti-discrimination legislation);
- increase in the average age of marriage and average age when having a first child;
- increase in coverage by a social security scheme providing an old-age pension, and, thus, a decrease in the need for children to provide for parents;
- access to birth control and legal abortions;
- high youth unemployment rates creating the perception of uncertainty about children's future;
- reduction in religious and traditional cultural influences.

The importance of these factors will influence the likely future evolution of the world's population as well as its demographic structure. Estimates suggest that the global fertility rate will fall below the natural replacement rate[8] in the next ten years.

**Table 1.4.** *Fertility rates 1950–1955 and 2010–2015*

| Major area, region, country or area | Total fertility (children per woman) | |
|---|---|---|
| | 1950–1955 | 2010–2015 |
| WORLD | 4.96 | 2.51 |
| High-income countries | 2.97 | 1.75 |
| Middle-income countries | 5.92 | 2.42 |
| Upper-middle-income countries | 6.01 | 1.85 |
| Lower-middle-income countries | 5.82 | 2.90 |
| Low-income countries | 6.39 | 4.89 |

*Source:* ESA (2013).

6. See the United Nations Population Division Database <www.un.org/esa/population>.
7. For Canada, the increase in life expectancy at age 65 is now (1999–2009) mainly the result of improvements in mortality coming from ages 75 and older (60 per cent of the increase for males and 80 per cent of the increase for females). See OCA (2014).
8. In high-income countries, the replacement rate is about 2.1; in low-income countries it may be as high as 3.0.

The reduction in fertility together with near universal increases in life expectancy have, and will, significantly impact the profile of populations, with a shift towards older median ages (Table 1.5) and increases in old-age dependency ratios (Table 1.6).

The projections to 2050 and 2100 depend on certain assumptions[9] about future mortality and fertility rates, which are by definition highly uncertain and arguably overly reliant on past experience and an extrapolation of this (see section 1.2). While the reality for much of the recent past has been an underestimate of future mortality improvements, the environment in which these gains have occurred – ever increasing health spending, medical advances, strong economic growth, as well as a survivor bias element[10] – most likely means that the future may differ from the past. In respect of mortality, an "over optimistic" assumption may be a cautious approach in respect of retirement programme costs but one that may underestimate the duration of potential health costs. In addition, the assumption that fertility rates will start to increase in developed countries is disputable.

However, median age is less sensitive to these assumptions than is average age and Table 1.5 does provide an indicator of likely future ageing.

**Table 1.5.** *Median ages in selected countries: 1950, 2015 and projections to 2050 and 2100*

| Region | 1950 | 2015 | 2050 | 2100 |
|---|---|---|---|---|
| WORLD | 23.5 | 29.6 | 36.1 | 41.7 |
| Africa | 19.3 | 19.4 | 24.8 | 34.9 |
| Asia | 22.0 | 30.3 | 39.9 | 46.5 |
| Europe | 28.9 | 41.7 | 46.2 | 47.2 |
| Latin America and the Caribbean | 19.9 | 29.2 | 41.2 | 49.1 |
| Northern America | 29.8 | 38.3 | 42.1 | 45.0 |
| Oceania | 27.9 | 32.9 | 37.4 | 43.9 |

*Source:* ESA (2013).

**Table 1.6.** *Old-age dependency ratio (ratio of population aged 65+ per 100 population 25–64): 1950, 2015 and projections to 2050*

| Region | 1950 | 2015 | 2050 |
|---|---|---|---|
| WORLD | 12 | 17 | 33 |
| Africa | 9 | 10 | 14 |
| Asia | 10 | 15 | 35 |
| Europe | 17 | 32 | 58 |
| Latin America and the Caribbean | 10 | 15 | 38 |
| Northern America | 17 | 28 | 47 |

*Source:* ESA (2013).

9. United Nations projections (ESA, 2013) use a "medium projection variant", which assumes a decline in fertility for countries where large families are still prevalent as well as a slight increase in fertility in several countries with fewer than two children per woman on average.

10. "Survivorship bias" refers to the situation where those in the past reaching older ages were fewer but were particularly robust to have managed to live to later years.

As fertility and mortality rates have changed significantly over recent decades, equally the health status of populations has changed. An analysis of the causes of death shows significant shifts as successful measures have reduced death rates linked to certain diseases and illnesses, particularly in early life. The quality of life – healthy life expectancy[11] – also reflects some of the factors referred to above (reliable and affordable food, medical advances, etc.) and has increased over recent decades as well. At the same, new health challenges mean that people are not universally living more healthily at all socio-economic levels and at all ages – healthy life expectancy has not increased as much as life expectancy and this raises significant issues for society; section 1.2 covers these issues in more detail.

The changes in the main causes of death – even over a relatively short period (see Table 1.7 for main causes of death for children younger than age 5) – show that emerging important causes of death (such as prematurity) are likely to be harder to reduce than historical causes of death and therefore this limits the scope for future improvements.

Indeed, the situation is similar at all age groups and the impact exacerbated by increasing life expectancy that automatically results in a higher proportion of the population with illnesses that are harder to address. Table 1.8 shows how the key cause of death changes with age, with a uniformity of the key cause of death across all categories of countries by older ages with these illnesses often being the most expensive to treat. Further, for some groups mortality has increased. For example, between 1978 and 1998, the mortality rate for the United States white population aged 45–54 reduced by 2 per cent a year; since 1998 mortality rates for this group have increased by 0.5 per cent per annum (Case and Deaton, 2015).

**Table 1.7.** *Three main causes of death for children younger than age 5, in 2000 and 2013*

| Category of country | Three main causes 2000 (% total of deaths) | Three main causes 2013 (% total of deaths) |
|---|---|---|
| Low-income | Acute respiratory disease (16%), diarrhoea (14%), malaria (13%) | Acute respiratory disease (16%), prematurity (13%), IPC* (12%) |
| Lower-middle-income | Acute respiratory disease (17%), prematurity (14%), diarrhoea (13%) | Prematurity (20%), acute respiratory disease (15%), IPC (11%) |
| Upper-middle-income | Acute respiratory disease (21%), prematurity (16%), IPC* (13%) | Prematurity (17%), congenital abnormalities (14%), acute respiratory disease (14%) |
| High-income | Congenital abnormalities (26%), prematurity (24%), injuries (9%) | Congenital abnormalities (28%), prematurity (26%), injuries (9%) |

*Notes*: *IPC = Intrapartum-related complications.

*Source:* WHO (2015a).

11. The assessment of health status is arguably more complex as developing meaningful measurement of such trends is challenging.

**Table 1.8.** *Main cause of death at different ages*

| Category of country | Age 20 | Age 35 | Age 50 | Age 65 | Age 80 |
|---|---|---|---|---|---|
| Low-income | Communicable diseases | Communicable diseases | Non-communicable diseases | Non-communicable diseases | Cardiovascular diseases |
| Lower-middle-income | Injuries | Communicable diseases | Non-communicable diseases | Cardiovascular diseases | Cardiovascular diseases |
| Upper-middle-income | Injuries | Communicable diseases | Non-communicable diseases | Cardiovascular diseases | Cardiovascular diseases |
| High-income | Injuries | Non-communicable diseases | Non-communicable diseases | Non-communicable diseases | Cardiovascular diseases |

*Source:* Beard et al. (2015).

The demographic and health profile of a population also depends on net migration flows that can be difficult to predict over the medium and long term. Looking at past trends is useful, but only up to a point. Migration is driven largely by the economic policy and prospects of the country and those of its neighbours, as well as by the wider political and economic context. As has been seen in Europe, Africa and the Middle East in 2015, conflicts can lead to sudden and unpredictable increases in migrant numbers. In addition, climate change and environmental degradation will likely lead to increasing international and internal migrant flows in the coming years.[12] Migrant flows influence the planning, management and financing of social security programmes, and the expectation is for such flows to increase significantly from current levels (Box 1.1).[13]

As touched on already, a number of factors influence demographic trends. These factors are evolving, and to anticipate the likely future demographic changes (e.g. in mortality and morbidity) an appreciation of such evolution is essential. While section 1.1 has presented important historical trends, it is important in assessing possible future developments to avoid over reliance on what has happened in the past. The future world may look very different. A more challenging external environment needs to be reflected in demographic projections to ensure that society in general and social security systems in particular are prepared to effectively provide the benefits and services that match the needs of the demographic profile of the country.

The rest of this chapter discusses some of underlying factors, or trends, likely to lead to such discontinuities going forward (i.e. the deviation of future developments from an extrapolated past experience).

**Box 1.1.** *The impact of immigration and emigration on social security systems*

The ISSA Handbook on the extension of social security to migrant workers (ISSA, 2014a) looked in detail at the issue of migrants and their impact on social security, and the measures social security institutions should consider in addressing the challenges raised. Unlike changes in mortality and fertility, changes in migration numbers over the short and medium term can be difficult to predict, which implies a need for a certain flexibility in the administration and management procedures of institutions. Migrants generally have a positive financial impact on social security finances in the short and medium term. However, the flow of those arriving and leaving should be analysed not only in respect of age distribution, but in respect of working characteristics (e.g. in Canada, immigrants tend to retire later than non-immigrants), health status (e.g. in Switzerland, immigrants in general have better health than the indigenous population), family structures, attitudes to social security, and so on.

12. More than 1.5 billion people depend on degrading land; 50 million are predicted to leave areas affected by desertification by 2020 (UNDCC, 2014).

13. ISSA (2013; 2014a) address specific migrant issues.

## 1.2. Underlying themes

This section looks closer at how key underlying factors may shape future mortality and morbidity experience. By identifying and highlighting these factors, social security administrations and policy-makers can put in place appropriate measures to respond to the impacts but also, and arguably more necessarily, reflect on proactive and preventive measures to reduce the risk itself.

The themes highlighted are not exhaustive and cover both the outcomes and the underlying factors.

### 1.2.1. Healthy versus unhealthy life expectancy

Assessments of increases in life expectancy must consider whether these extra years are lived in "good health". As life expectancy increases in all regions of the world, especially at older ages, how long people can live in good health becomes the important issue. The health status of the population as well as the demographic and socio-economic profiles of healthy and unhealthy subpopulations affect many social security programmes, including those addressing health, disability, unemployment, pension and long-term care. The analysis of trends across regions and countries allows policy-makers to look at other country and programme experiences to compare the challenges faced and the possible ways to mitigate these. Furthermore, looking at trends from other regions may provide useful indications for demographic developments that may affect other countries in the future.

The use of healthy life expectancy statistics is becoming more widespread, reflecting not only the key objective of keeping populations healthy but also a need to anticipate the negative impacts of unhealthy individuals on society and the economy. For example, the concept of healthy life expectancy has received support internationally with national and multilateral agencies performing such calculations (Public Health Agency Canada, United Kingdom Office of National Statistics, United States Centers for Disease Control and Prevention, World Health Organization, etc.).

This section addresses trends in healthy life expectancy, investigating how these trends vary by region and across countries within the same region. Quantifying such differences and predicting future evolution provides useful input in the development of appropriate policy decisions in many areas of social security programme operation, including in design, sustainability assessment, fund investment, and administration. Of note, national and multilateral organizations have introduced a number of quantifying measures.[14]

However, determining accurate, consistent and comparable measurements of healthy life expectancy is challenging. Being healthy is not only subjective but covers both mental and physical well-being, which evolves over time, is difficult to quantify, and can be partial or full. While a number of measures do exist, the choice of methodology and the assumptions underlying their calculation are important – particularly where data quality is poor. In some cases, the trends in the value of measures determined (rather than their absolute level) are the more useful indicators. Care should equally be used when comparing health measures calculated by different agencies, since the same terminology may be used to define different concepts. Further, though these measures are based, often fully or partially, on self-reported health status data, the ways in which the data are collected and the questions asked may differ.

14. More details on the challenges of defining and estimating healthy life expectancy are set out in Chapter 2.

***Measurements of healthy life.*** Calculations performed by the World Health Organization (WHO) that measure health status refer to health-adjusted life expectancy (HALE) or healthy life expectancy (HLE). These concepts define the average number of years that a person can expect to live in "full health" by taking into account years lived in less than full health due to disease and/or injury.[15]

Globally, the WHO estimates that in 2013 the unisex HALE at birth was 62 years, compared to an average life expectancy of 71 years.[16]

Figure 1.1 shows well-pronounced differences in life expectancy and HALE at birth in 2013 for different regions of the world, as calculated by the WHO.[17] African countries have the shortest life expectancy (less than 60 years) at birth as well as the lowest number of years in good health (about 50). In Africa, the expectation is that a newborn child will spend about 15 per cent of his or her life in poor health.[18] Typically, these "unhealthy years" are at the end of life, but may also occur at younger ages (with total or partial recovery to follow – for example, the effects of prematurity or mental health issues). In comparison, in the Western Pacific region, while the absolute number of years spent in poor health is the same as in Africa (eight years), the expectation is that a newborn child will spend 10 per cent of life in poor health. The healthy life expectancy of females in three regions – Americas, Western Pacific and Europe – is almost the same (about 70 years), but the number of years lost due to poor health varies significantly, being 11 for Americas, eight for Western Pacific and ten for Europe. This highlights that depending on the risk contingencies that a given social security programme is designed to address (old age, disability, unemployment, etc.) taking life expectancy on its own as a measure of sustainability or a proxy of costs could be misleading.

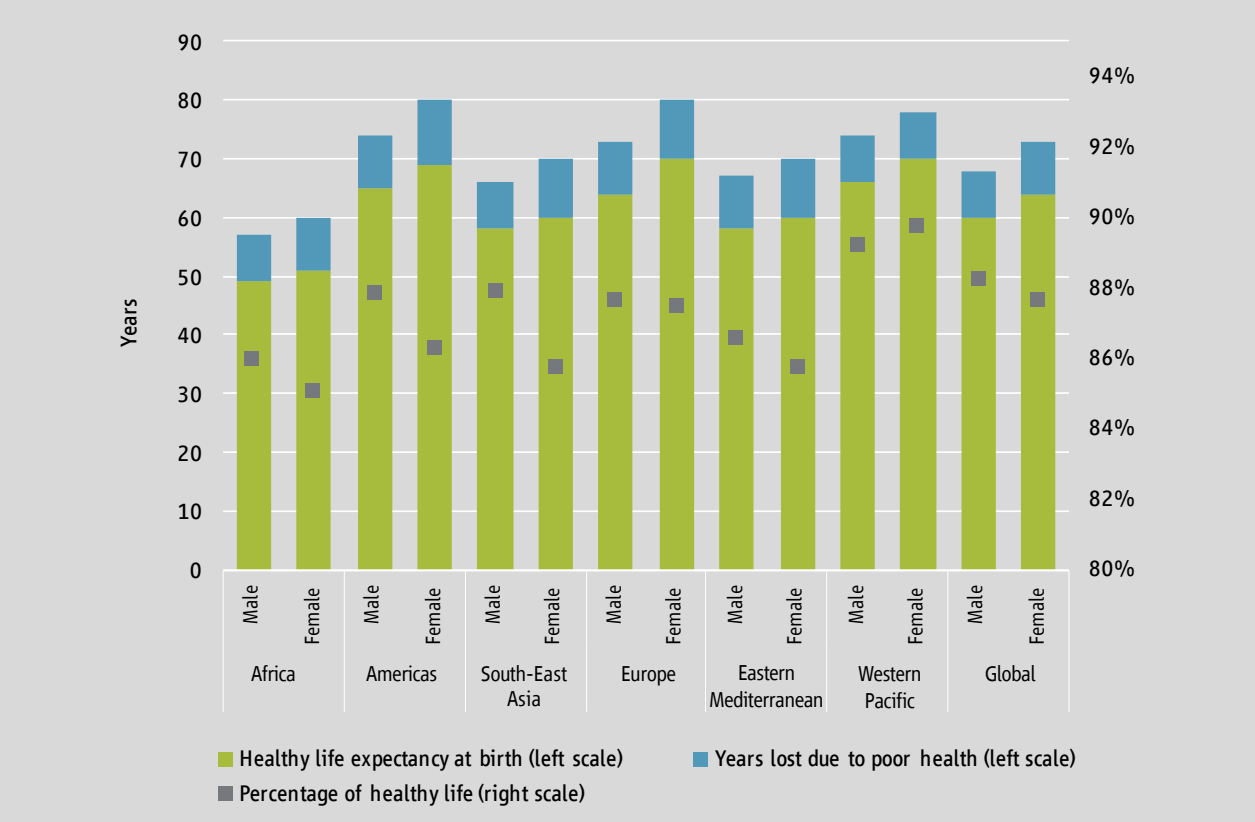
15. For a definition, see <http://www.who.int/healthinfo/statistics/indhale/en>, and for more details on the WHO methodology, see Salomon et al. (2001).

16. World Health Organization, see <http://apps.who.int/gho/data/view.main.690?lang=en>.

17. In analysing these statistics, it is important to be reminded of the data limitations. As stated on the WHO website, "the challenge is the lack of reliable data on mortality and morbidity, especially from low-income countries". In analysing these statistics, it is important to be reminded of the data limitations. As stated on the WHO website, "the challenge is the lack of reliable data on mortality and morbidity, especially from low-income countries".

18. See WHO data <http://apps.who.int/gho/data/view.main.690?lang=en>, and authors' calculations.

**Figure 1.1.** *Healthy life expectancy and total life expectancy at birth (healthy life expectancy plus years spent in poor health) in 2013 by WHO regions*




Source: Authors' calculations based on WHO data.

As shown in Figure 1.1, current life expectancies at birth vary significantly across regions. Over the last decade and a half, regions comprising a higher proportion of developing countries experienced a faster pace of life-expectancy improvements than more developed regions – in both absolute and relative terms.[19] Between 2000 and 2013, the most pronounced increase was in African countries, where life expectancy from birth increased by almost 8 years mainly due to declining mortality rates at younger ages. In contrast, over the same period life expectancy increased by between 2.5 and 3.5 years in the Americas and Europe. Declining mortality rates at older ages has been main driver of these increases.[20] So while the gap in life expectancies of different countries may be narrowing, the sources of the improvements vary. This has important implications for the future development of mortality and morbidity.

19. World Health Organization <http://apps.who.int/gho/data/view.main.690?lang=en>.
20. World Health Organization <http://apps.who.int/gho/data/view.main.690?lang=en>.

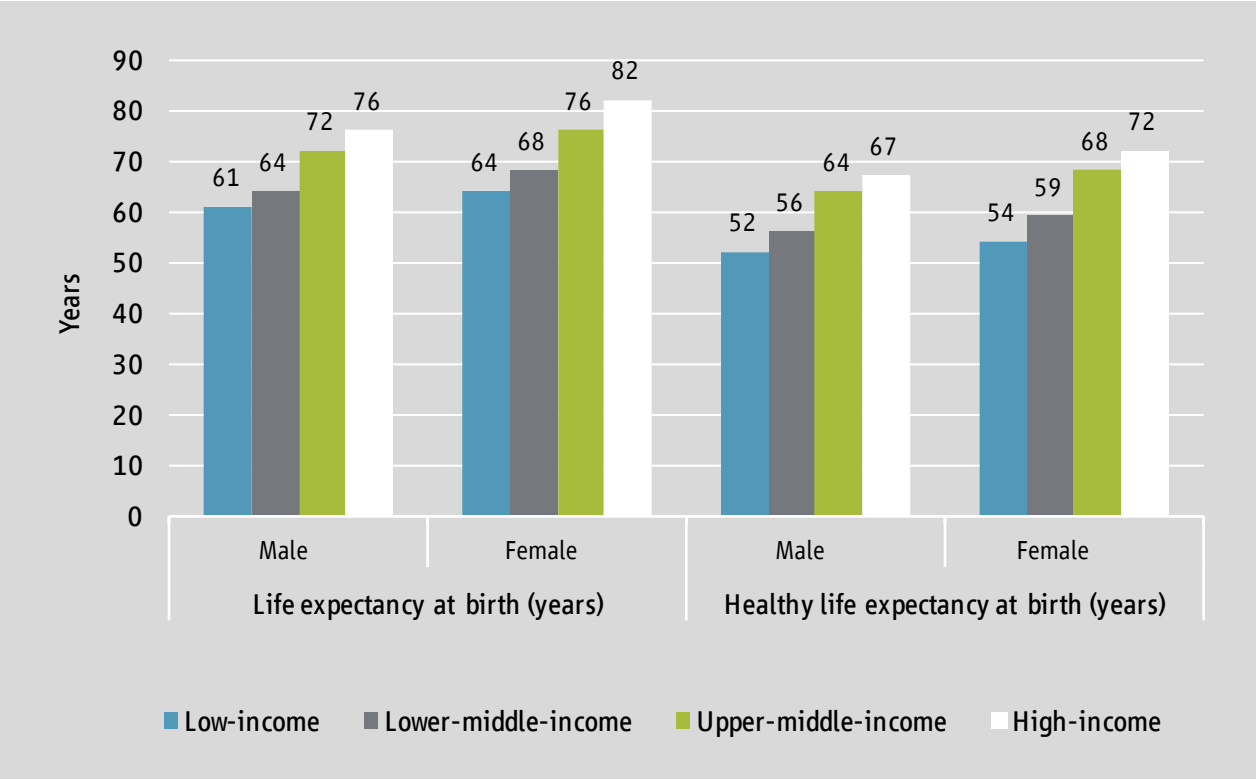
The number of years lived in poor health is often influenced by overall country wealth, absolute and relative levels of poverty, health care spending per capita, cultural characteristics such as family support mechanisms, lifestyle (e.g. diet and exercise), and other factors including societal issues. The Urban Institute has reported that "unhealthy behaviours – drug use, smoking, overeating – will often arise and persist within certain social and economic contexts" (Astone, Martin and Aron, 2015). Figure 1.2 shows that between different regions there is a wide distribution of life and healthy life expectancies. There are also large variations within the same country (discussed later in this section).

**Figure 1.2.** *Equivalent healthy years of life lost at birth in 2013, plotted against life expectancy at birth, unisex (WHO Member States in Africa and Europe)*


Source: Authors' calculations based on WHO data.

As shown in Figure 1.3, overall country wealth appears to be one of the key factors in population health outcomes. The difference in life expectancy between low-income and high-income countries (as per the World Bank classification)[21] is 15 years for males and 18 years for females. Similar differences relate to observed healthy life expectancy, but low-income and high-income countries exhibit higher differences between regular and healthy life expectancies as compared to middle- income countries. In the case of low-income countries, generally poor living conditions and a lack of appropriate medical care may explain the differences. In the case of high-income countries, the ability of the health system to prolong the life of the elderly and the ability of society and of individuals to pay for better care for the elderly seem to be the main causes of such differences. It is interesting to note the smaller difference in healthy life expectancy in upper-middle-income and high-income countries (3 years for males and 4 years for females) than the corresponding differences in life expectancy (4 years for males and 6 years for females). Behavioural differences (such as lifestyle and diet) may account for this phenomenon.

**Figure 1.3.** *Difference in life expectancy and healthy life expectancy at birth by World Bank income groups, 2013*

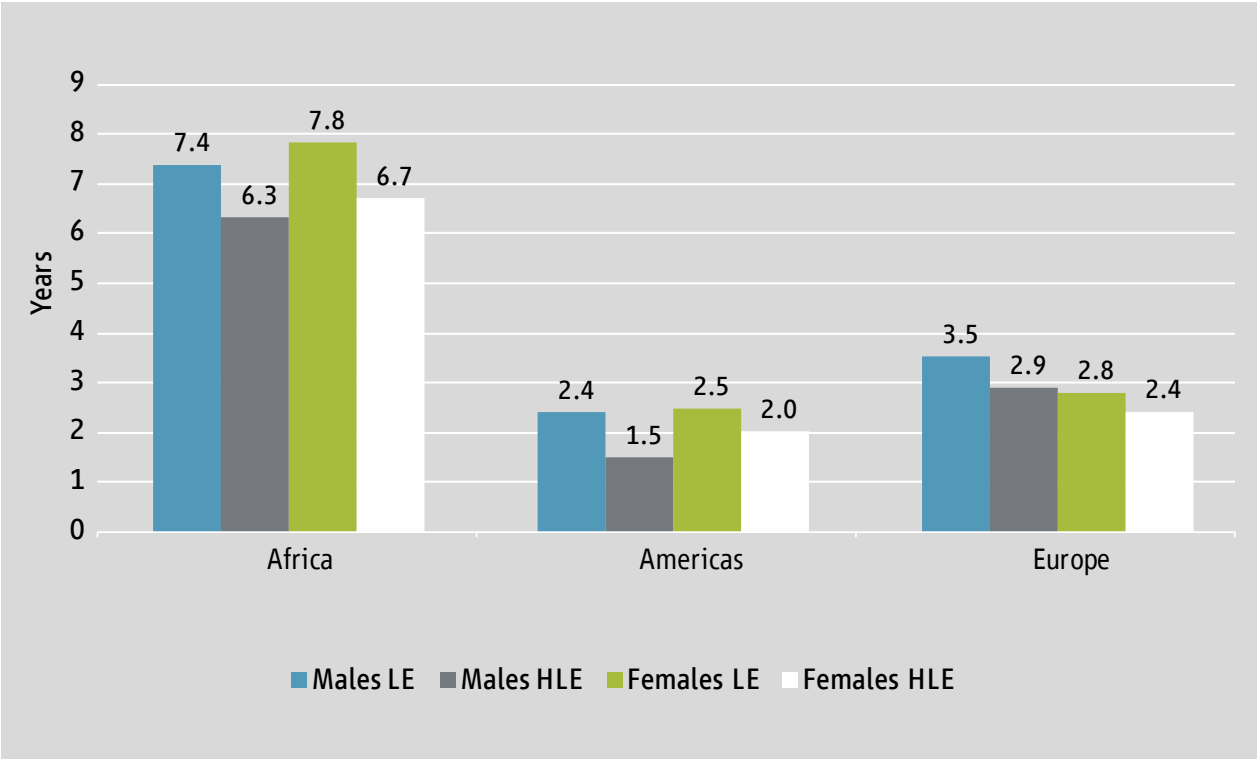



Source: Authors' calculations based on WHO data.

21. For the World Bank definition of countries' classification by income in 2013, see <http://data.worldbank.org/news/new-country-classifications>.

The WHO first calculated healthy life expectancy in 2000. Although a relatively recent measure, comparison of increases in life expectancy and in healthy life expectancy between 2000 and 2013 for African, American and European member countries of the WHO shows that healthy life expectancy has been increasing more slowly than regular life expectancy over that period. As shown in Figure 1.4, life expectancy in African countries increased on average by 1.1 years more than healthy life expectancy over this time. For the Americas and for Europe the lag in the increase in healthy life expectancy is less, especially for women. Salomon et al. (2012) presented a similar conclusion concerning healthy life expectancy in an analysis of 187 countries in 1990 and 2010: "for every year of increase in life expectancy at birth since 1990, countries have gained only ten months in healthy life expectancy on average. At age 50, each year of gain in life expectancy corresponded to gains in healthy life expectancy of only about nine months".

**Figure 1.4.** *Increases in life expectancy (LE) and healthy life expectancy (HLE) at birth between 2000 and 2013 for WHO Member States in Africa, Americas and Europe*




Source: Authors' calculations based on WHO data.

The fact that increases in healthy life expectancy lag increases in general life expectancy implies an increase in years spent in poor health. This is a concern given the significant increase in medical spending in real terms over the last 50 years as well as in spite of improvements in food supply, access to medical services and better hygiene. Multiple reasons are likely to explain this relative lack of success. Whereas modern medicine and surgical techniques have made significant advances in responding to certain medical cases, often the result is to only partially cure diseases rather than treat the underlying causes. One potential issue is that the global incentives in health care are often contrary to a nation's health objectives. For example, there may be little or no financial incentives for the pharmaceutical industry to reduce the incidence of certain diseases and efforts may have focused more on reducing the severity of the impacts themselves. Healthy eating initiatives and other preventive measures have received less financing even though a number of studies show that their cost effectiveness easily outweighs the use of medication in the majority of cases.[22] Changing structures and mechanisms to address this may prove effective in improving health status with potential financial savings particularly in diseases prevalent in emerging economies.

Socio-economic inequality combined with increased access to cheap and relatively unhealthy food supplies (for example, the use of sugar, fructose and other sweeteners) and the resulting changes in traditional diets create the potential for further stagnation in healthy life expectancy (McClelland et al., 2016; Gewertz and Errington, 2010).

Another reason for the slower increase in healthy life expectancy may be found in the fact that more people develop multiple diseases, especially at older ages. For example in Scotland, the number of morbidities and the proportion of people with multimorbidity increases substantially with age. By age 50, half of the Scottish population had at least one morbidity, and by age 65 years most were multimorbid (the presence of two or more disorders).Indeed 23% of all patients were multimorbid with the prevalence increasing substantially with age. A similar trend can be observed in many countries.[23]

Population ageing together with growing inequality, changing diets and a reduction in exercise will eventually result in a dramatic increase in people with multiple chronic medical conditions. Since having multiple chronic medical conditions is associated with poor quality of life, longer hospital stays, more post-operative complications, a higher cost of care, and higher mortality, the future negative impacts of these on social security systems could be significant. Specific impacts on benefit programmes and organizations providing care could include complex self-care needs, challenging organizational problems (accessibility, coordination, and consultation time), polypharmacy, increased use of emergency facilities, difficulty in applying guidelines, and fragmented, costly, and ineffective care (Khanam et al., 2011).

In conclusion, whether older people are in better health on average than previously was the case is debatable. The WHO concludes that "there is little evidence that older people today are experiencing better health in later years than their parents did at the same age",[24] although experiences do vary by country and within sub-groups. Indeed in some countries including Belarus, Belize, Paraguay and South Africa, healthy life expectancy has actually dropped since 1990, while in Lesotho and Swaziland the drop in healthy life expectancy is more than a decade compared to two decades previously

22. See <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=19015>.

23. For example, Rocca et al. (2014), Boutayeb, Boutayeb and Boutayeb (2013) and Arbelle et al. (2014).

24. See WHO data <http://www.who.int/mediacentre/factsheets/fs404/en/>. There is a "selection" process – namely, in the past less people lived to older ages and those that did were particularly robust to external factors. With an increasing numbers living to older ages, this selection effect diminishes. A potential corollary is therefore the risk of over-estimating future improvements in life expectancy if this effect is not properly taken into account. This is sometime termed as "frailty theory".

(Murray et al., 2015). At the same time, other countries have witnessed significant increases in life expectancy – Cambodia, Ethiopia and Nicaragua have recorded increases of around 14 years since 1990, a significant part of the increase due to the end of conflicts. The impact of sizeable amounts of unhealthy years on social security systems is likely to be significant (section 1.3 covers this issue in detail).

### 1.2.2. Inequality in mortality and morbidity outcomes

For social security systems in their planning and responses to life cycle risks, it is not only the average or median outcomes that are important, but the distribution of such outcomes. This is particularly true for health outcomes where a small proportion of the population incurs the majority of health costs. One example of such a situation is the United States. In 2009, 1 per cent of the United States population accounted for 22.7 per cent of total health care expenditures and 5 per cent of its population accounted for 50 per cent of overall health care spending (Cohen, 2014). In addition, consideration should be given to the influence of access to health care (due to cost or geographical accessibility) on morbidity. Even for countries with universal health coverage, these impacts may be important. For example, unmet care needs (i.e. when a person did not visit a doctor when he or she had a medical problem, did not receive recommended care or did not buy the prescribed medication) vary significantly between individuals depending on income levels. The reported difference between unmet needs for those with income below and above average is about 16 per cent in France, 12 per cent in Canada and Germany, and 13 per cent in the Netherlands (OECD, 2015b, Chart 7.6). Therefore, the development of morbidity experience for different groups is important.

The difference in life expectancy between rich and poor is substantial and, significantly, this differential has widened over recent years. For example, in the United States life expectancy at age 50 for men born in 1930 was 5-years longer for those in the five highest earning categories compared to men aged 50 in the lowest earnings category. Thirty years later, for men born in 1960, this differential in life expectancy at age 50 in the different income categories had grown to 13 years (National Academies of Sciences, Engineering, and Medicine, 2015). This implies that individuals at higher socio-economic levels receive higher lifetime benefits from social security programmes than those at lower socio-economic levels, creating potentially regressive effective subsidies across groups. Added to this is the fact that those in lower socio-economic groups have lower wages and retire earlier (56 per cent of those in the bottom third earnings group claim benefits at or before age 62 compared to only 42 per cent in the top earnings group), which penalises outcomes (Bosworth, Burtless and Zhang, 2015). It is important to both analyse and address the causes of these differences in outcomes to ensure more optimal outcomes for society.

These trends have implications for the provision and financing of benefits and for decisions regarding intergenerational and intra-generational equity. This is so because inequalities are varied and an overview of different categories is required to assess in detail the effects of such trends, as well as to assess the practical measures required for social security systems to adapt to and mitigate these.

This section identifies such trends by geographic location, gender, education level, socio-economic status, and race using specific countries as examples.

**Gender differences.** Women generally live longer than do men, regardless of the fact that over the last couple of decades in high-income countries the gap between male and female life expectancy at

birth has been decreasing.[25] At the same time, women spend less years of their life in good health. In African countries and the South-East Asia Region (WHO classification), these differences are especially pronounced. In both these groups of countries, the difference in life expectancy at birth between males and females is about 3 or 4 years, while the difference in healthy life expectancy at birth stands at 2 years (WHO, 2016).

The difference in the period spent in good health between men and women reduces even further with age. Figure 1.5, based on Eurostat data, shows life expectancy and healthy life years at age 65 by gender for European Union (EU) countries. The measure of "healthy life years" used here is different from the "healthy life expectancy" measure calculated by the WHO. Healthy life years (HLY) are the number of years spent free of any limit to activity and is equivalent to disability-free life expectancy.[26]

Across the EU27, women on average live 20.1 years from age 65 compared to just 16.5 years for men (a difference of 3.6 years). However there is very little difference in healthy life expectancy from age 65 between men and women (8.4 years and 8.6 years respectively), suggesting that women spend almost all extra years of life with some limit on their activity. However, outcomes do vary significantly by country. In eight of the 31 countries shown, men actually have longer healthy life expectancy than for women (for instance, Cyprus, Greece, Italy, Portugal and Spain). In others, women at age 65 live longer than men and have more years without disability (e.g. France, Luxembourg, Norway and Sweden).

However, in all cases, women have longer periods of unhealthy life than do men. The expectation is that women will spend more resources on medical care, as well as on some types of assistance that will depend on the degree of the daily activity limitations. Higher costs push a higher percentage of older women below the poverty line than is the case for men.[27] Other important factors are generally lower levels of women's income at older ages,[28] longer life expectancy thus a longer possible period over which income is paid, higher probability of widowhood, and the breakdown of traditional family care models (the latter is partially due to increasing labour mobility).

Given younger generations of women have higher labour force participation rates, that they will have better levels of economic security in old age is to be expected. The reality is that women commonly earn less than what men earn, and are more likely to be underemployed and have irregular careers often owing to providing care to children and other family members.[29]

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25. High-income countries in general have a much larger gap between male and female life expectancy at birth than middle-income and low-income countries (United Nations classification). For the last two groups, this gap has been more or less stable.

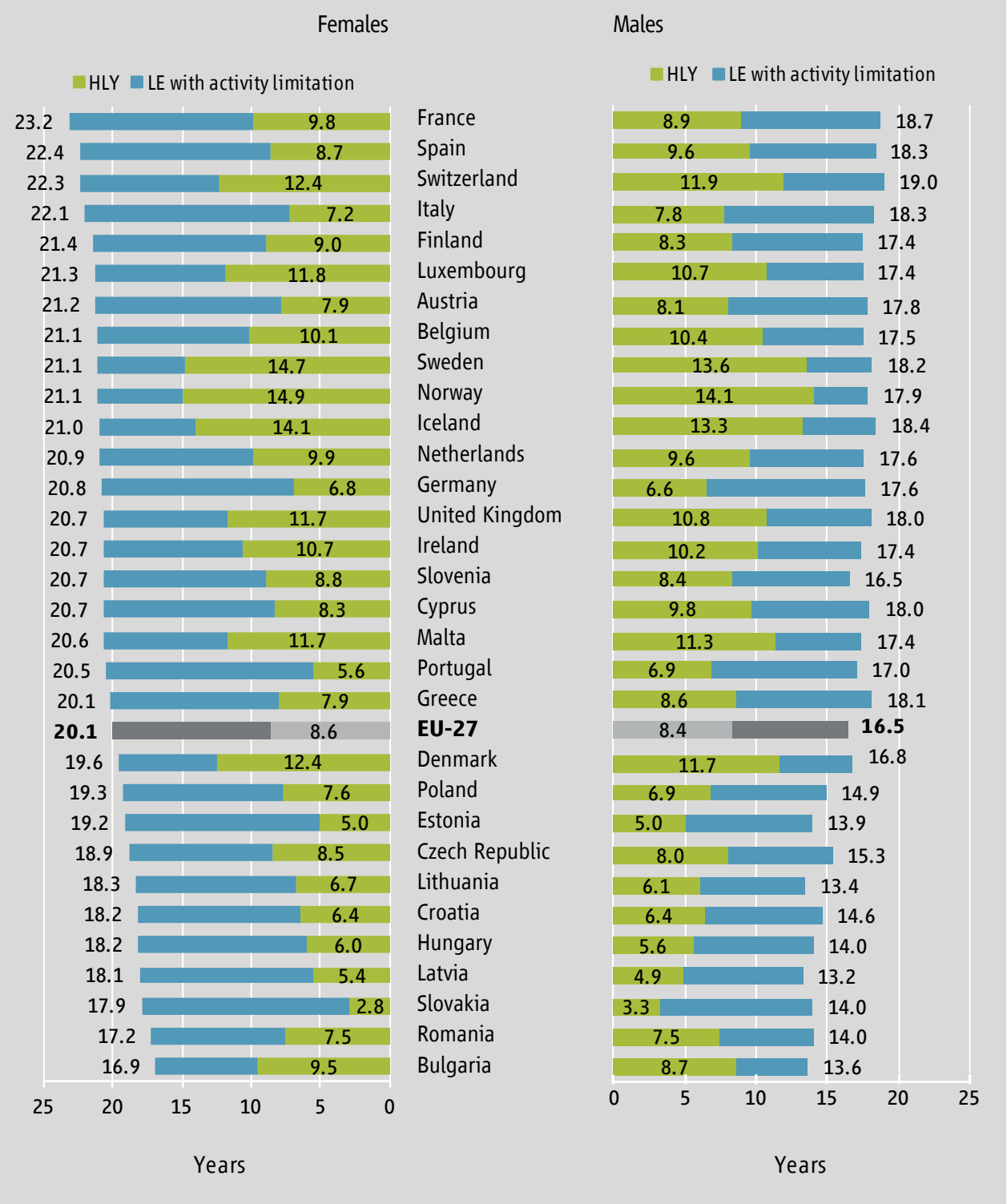
26. For more details on the definition and methodology, see <http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Healthy_life_years_(HLY)>.

27. In all OECD countries, women have a higher rate of poverty in retirement than men. The average poverty rate of men is 8 per cent in OECD countries, compared to 12 per cent for women. See OECD (2016b).

28. In the EU (Tinios et al., 2015), on average, men are entitled to pensions that are 40 per cent higher than the pensions paid to women.

29. In OECD countries, the gender wage gap for full-time employees ranges from 37.4 per cent in the Republic of Korea to 3.54 per cent in Ireland (OECD, 2014b). In the European Union, the gap is on average 16.4 per cent (EC, 2015b, 2013 figures). In respect of contributory service, in the United Kingdom, only 46 per cent of female pensioners received the full Basic State Pension (BSP) compared with 80 per cent of male pensioners (UK Office of National Statistics <http://www.ons.gov.uk/ons/rel/pensions/pension-trends/chapter-5--state-pensions--2013-edition/sum-chp5-2013.html>).

**Figure 1.5.** *Life expectancy (LE) and healthy life years (HLY) at 65, by gender, 2008–2010 average*




*Source:* Eurostat statistics database.

In many developing countries, multimorbidity is a greater concern for older women (Boutayeb, Boutayeb and Boutayeb, 2013). While this phenomenon is not as pronounced as in developed countries, younger women in these countries may suffer from higher psychological distress and, as a result, from complex mental conditions. For example, in Switzerland, "Women generally reported lower quality of life and higher distress than men. Relative to men, well-being in women was subject to more diagnostic (alcohol abuse/dependence, depression, generalized anxiety disorder, bulimia) and social influences (partner, promotion)" (Gamma and Angst, 2001).

A recent study published by the Urban Institute (Astone, Martin and Aron, 2015) reported that between 1999 and 2011 the death rates among non-Hispanic white women aged 15 to 54 in the United States increased,[30] caused by worsening social trends such as drug use, obesity and lack of exercise, smoking, and general stress (Astone, Martin and Aron, 2015). Moreover, it is possible to attribute more than half of this increase to accidental poisonings from prescription opioids (increasing from 3.3 to 15.9 deaths per 100,000 women). This trend highlights a disturbing element in the overall health of adult white women in the United States (mortality of black women in the same age group fell over the same period). The implications of this phenomenon on maternal health as well as on the health of this cohort when they reach advanced ages are likely to be significant.

*Differences in life expectancies and health as measures of inequalities within a country*

The degree of differences in life expectancy and in health between a country's subpopulations (be it by location, income, occupation, race, etc.) is a measure of inequality. These differences are often indicators of deeper societal and economic problems. From an economic perspective, health inequalities lead to losses in productivity, reduced levels of tax revenues and social security contributions, reduced consumption and increased pressure on health care systems, as well as other social programmes. From a societal perspective, loss of human dignity, segregation and social unrest may occur. Finally, from the perspective of social security programmes these differences raise questions about benefit adequacy (i.e. will the health status of certain subpopulations adversely affect benefit accumulation and/or eligibility requirements leading to inadequate benefits provided during periods of ill health, disability and/or retirement?). Also raised are questions of the resulting intra-generational transfers from subpopulations with the worst health status to subpopulations with better health (for example, in the case of the strengthening of eligibility requirements for benefits). Socio-economic status (as defined by income, level of education, poverty and deprivation, geographic location, as well as other indicators) has significant impacts on mortality and the health status of individuals (including multimorbidity, healthy life expectancy, etc.). Factors such as lifestyle (e.g. diet, exercise), prevalence of smoking, substances abuse, and access to quality health care impact health. While some of such factors may be within individual control (such as smoking), other outside factors (e.g. level of income and geographical location, see Box 1.2) can play a role in access to health care or the availability of means to follow a healthy lifestyle. In short, the key challenge for health systems is to address the reality that those in worse health are those with the least resources, less likely to access health services and to receive and act on effective preventive measures (WHO, 2015a).

30. For non-Hispanic white women, the death rate increased by some 13.6 deaths per 100,000 from 1998 to 2011 (Astone, Martin and Aron, 2015).

**Box 1.2.** *The health effects of food poverty*

Speaking in relation to the experience of Ireland, Dr C. Foley-Nolan, Director, Human Health and Nutrition, Safefood, states:

Food poverty can have both short- and long-term health effects on children and adults. Families living on stretched budgets eat less well and on a day-to-day basis can have lower energy levels. Longer-term, the consequences can be a shorter life expectancy and higher rates of diet-related chronic diseases such as osteoporosis, Type 2 diabetes, obesity and certain cancers. In trying to make a limited household budget go further, people often fill up on high-calorie foods so are ending up nutritionally poor.

*Source:* <www.safefood.eu>

Socio-economic status is often defined by several measures that, in turn, are often correlated with each other. Therefore, multiple indicators present a more complete picture of different outcomes in mortality and morbidity. As an example, in the United Kingdom socio-economic status is defined by geographical location (within the postal code determinant) and by income, both measures being highly correlated. In the United States, geographical location, race and level of education are used as complementing proxies.

The United Kingdom Office of National Statistics (ONS) publishes on a regular basis, life and health statistics on the United Kingdom population and highlights the differences in life expectancy by location. In its 2015 statistical bulletin[31], the ONS stated that the gap in life expectancy at birth between the best and worst location in the United Kingdom in 2012-14 was 8.6 for boys and 6.9 years for girls[32]. The gap at age 65 between the best and worst location was about 5.8 years for both males and females.

The disparities in health by socio-economic status elsewhere in the United Kingdom are even more pronounced. Table 1.9 shows the differences for regular and healthy life expectancies between the most and least affluent deciles of the population of England. Males living in the poorest neighbourhoods are expected, on average, to die nine years earlier than those living in the richest neighbourhoods. Although the have average life expectancy of about 74 years, lowest income males are expected to remain healthy only up to age 52; i.e. to spend almost 22 years of their life in "poor" health. For comparison, the expectation is that their richest counterparts will live to age 83 and be healthy up to age 70. The picture for females is similar.

**Table 1.9.** *Difference in life expectancy (LE) and healthy life expectancy (HLE) at birth across national deciles of area deprivation in England, 2011–2013*

| England | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | Most affluent | Least affluent | Range | Most affluent | Least affluent | Range |
| Life expectancy (years) | 83 | 74 | 9 | 86 | 79 | 7 |
| Healthy life expectancy (years) | 70 | 52 | 18 | 71 | 52 | 19 |
| Proportion of life in "good" health (%) | 71 | 85 | 14 | 83 | 66 | 17 |

*Note:* Excludes residents of communal establishments, except National Health Service housing and students in halls of residence where inclusion takes place at their parents' address.

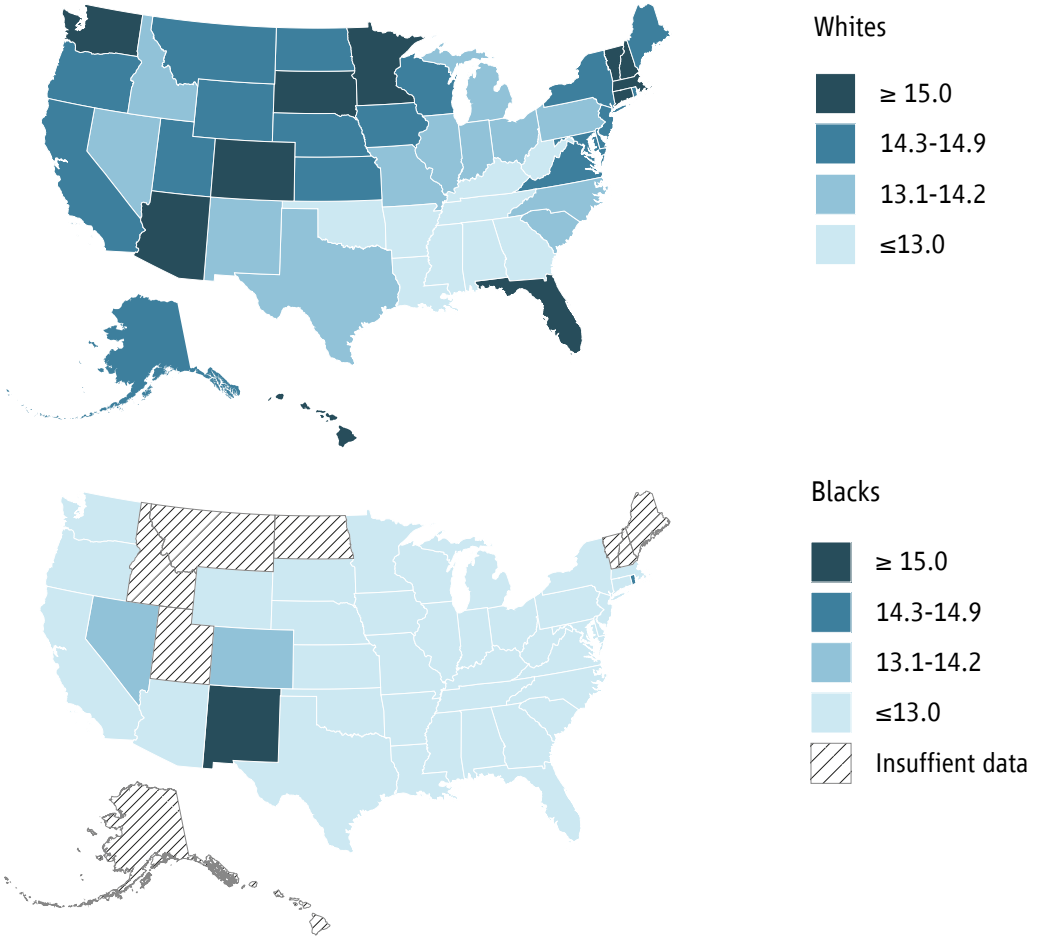
*Source*: ONS (2015a).

31. See ONS (2014).
32. Life expectancy for newborn baby boys was highest in Kensington and Chelsea (83.3 years) and lowest in Blackpool (74.7 years). For newborn baby girls, life expectancy was highest in Chiltern (86.7 years) and lowest in Middlesbrough (79.8 years).

Multiracial countries, for example the United States, experience differences in life expectancy and health status by race, with race often highly correlated with socio-economic status. In 2013 in the United States, average life expectancy for the black population was 3.8 years lower than for the white population and 6.5 years lower than for the Hispanic population (Arias, Kochanek and Anderson, 2015). The main drivers of this gap compared to the white population life expectancy were heart diseases (loss of 1 year of life), cancer (loss of 0.6 years of life) and homicides (loss of 0.5 years of life) (Kochanek, Arias and Anderson, 2013). However, the gap has reduced significantly in recent years – it was 5.9 years in 1999. The reason for the narrowing of the gap are greater than average decreases in mortality rates for heart disease, cancer, HIV and "unintentional" injuries amongst others. The recent increases in mortality for 25–54 year olds in the country concern only white males and females, which suggest a further reduction in the differential.

The difference in life expectancy between black and white populations accompanies a difference in health. As shown in Figure 1.6, in 2013 the healthy life expectancy at age 65 of the black population was lower than that of whites in all states but two (Nevada and New Mexico). Even in states where the white population has shorter healthy life expectancy (e.g. Alabama and Mississippi), the healthy life expectancy of the black population is about 3 years lower.

**Figure 1.6.** *State-specific healthy life expectancy in years at age 65 years, by race — United States, 2007–2009**




*Source:* Centers for Disease Control and Prevention (2013).

*Note*: Data for 11 states were not reported because the total number from 2007 to 2009 for the black population in those states was <700: Alaska, Hawaii, Idaho, Maine, Montana, New Hampshire, North Dakota, South Dakota, Utah, Vermont and Wyoming.

Another widespread predictor of mortality as well as the degree of inequality is the level of education. Table 1.10 shows how the disparity in mortality by level of education varies by country with United States and France showing the highest inequality (men with a low level of education have mortality rates that are twice as high as men with a high level). The distribution of education in the population, in turn, could be driven by socio-economic variables, geographic location and race.

As shown in Figures 1.7 and 1.8, lower socio-economic status is also associated with higher multimorbidity as well as with higher comorbidity – the combination of mental and physical health issues. As stated in Barnett et al. (2012), "The onset of multimorbidity occurred 10–15 years earlier in people living in the most deprived areas compared with the most affluent, with socio-economic deprivation particularly associated with multimorbidity that included mental health disorders".

Several published studies link a higher incidence of multimorbidity in countries with poverty, low educational level, as well as other socio-economic indicators (Chung et al., 2015). Multimorbidity is also associated with higher medical costs (Marengoni et al., 2011).

**Table 1.10.** *Mortality rates[a] per 100,000 person-years according to education level[b] and distribution of education for men aged 30–74 in selected European countries and the United States*

| | Rates per 100,000 person - years | | | | Relative mortality level | | Distribution of education in the population | | |
|---|---|---|---|---|---|---|---|---|---|
| | Low ed. | Middle ed. | High ed. | Overall rate | Low to high ed. | Low to middle Ed. | % Low | % Middle | % High |
| United States (All) | 1,840 | 1,339 | 885 | 1,379 | 208% | 151% | 20 | 54 | 26 |
| United States (Whites) | 1,779 | 1,316 | 876 | 1,334 | 203% | 150% | 19 | 54 | 27 |
| United States (Blacks) | 2,264 | 1,658 | 1,198 | 1,903 | 189% | 138% | 32 | 55 | 14 |
| Finland | 1,700 | 1,410 | 942 | 1,528 | 180% | 150% | 49 | 30 | 22 |
| Sweden | 1,151 | 953 | 706 | 1,026 | 163% | 135% | 40 | 43 | 16 |
| Norway | 1,498 | 1,194 | 873 | 1,272 | 172% | 137% | 30 | 48 | 22 |
| Denmark | 1,659 | 1,400 | 982 | 1,508 | 169% | 143% | 43 | 38 | 19 |
| England/Wales | 1,128 | 786 | 652 | 1,074 | 173% | 121% | 83 | 7 | 10 |
| Belgium | 1,590 | 1,264 | 999 | 1,480 | 159% | 127% | 61 | 22 | 17 |
| France | 1,285 | 955 | 624 | 1,132 | 206% | 153% | 50 | 37 | 13 |

*Notes:*

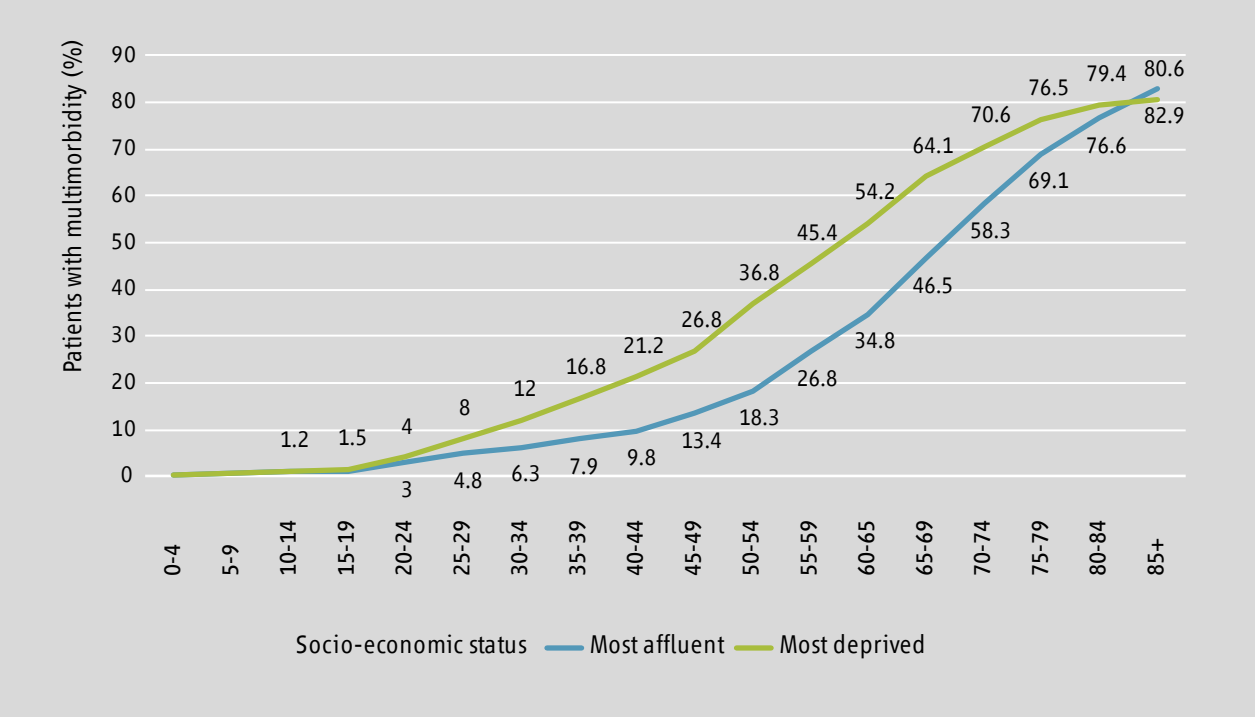
a. Rates are directly standardized to the United States census population of 1995. Most samples were aged 30–74 at baseline and had at least 10 years of follow-up; however, samples in Belgium and Denmark were aged 30–79 at baseline and had follow-up of 5 years or less. Most data sets begin in the 1990s; for example, the United States, sample was from the 1989–1993 National Health Interview Survey with mortality follow-up through 2002.

b. Education categories: Low education (ed.) = comparable to 0–11 years; Middle education (ed.) = comparable to 9–15 years; High education (ed.) = comparable to 16+ years or a bachelor's degree in the United States.

c. Education levels for England and Wales do not correspond to the International Standard Classification of Education levels. The low education category includes some individuals with medium education as well. No further distinction was possible through census data.

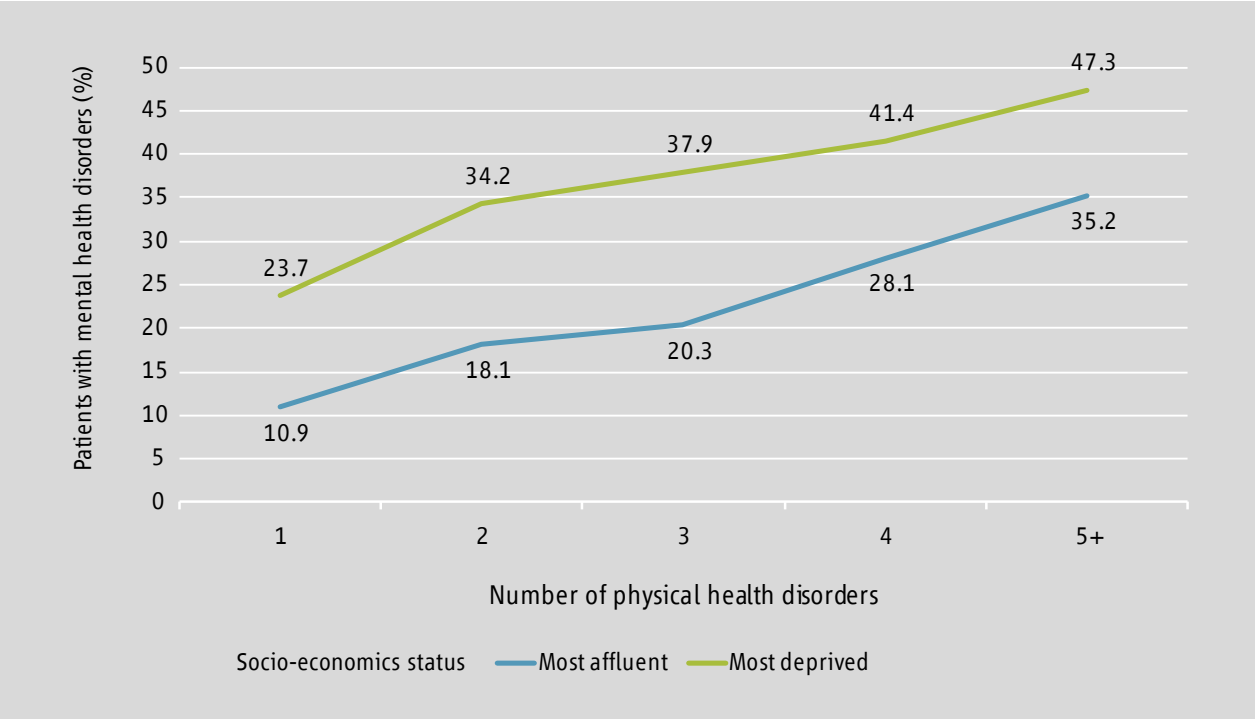
*Source*: Adapted from Crimmins, Preston, and Cohen (2011, Table 9.3).

**Figure 1.7.** *Prevalence of multimorbidity by age and socio-economic status, Scotland. On socio-economic status scale, most affluent 10 per cent and most deprived 10 per cent*




*Source*: Barnett et al. (2012).

**Figure 1.8.** *Physical and mental health comorbidity and the association with socio-economic status, Scotland. On socio-economic status scale, most affluent 10 per cent and most deprived 10 per cent*




*Source*: Barnett et al. (2012).

## 1.2.3. New health challenges

The health of the global population has been shifting in accordance with demographic changes. This was made clear in the early twenty-first century when the WHO's Global Burden of Disease established that 2004 was the first year in human history where the mortality of chronic non communicable diseases (NCDs) exceeded that resulting from communicable, maternal, perinatal and nutritional conditions (WHO, 2008).

Non-communicable diseases – a diverse set of pathologies that are not passed from person to person and are generally of long duration and slow progression – have four main types that cause the most mortality and morbidity: cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes.[33]

Complementing NCDs as a rising global health issue is the increasing prevalence of mental disorders. This relates to different sets of conditions with varied presentations, generally characterized by some combination of abnormal thoughts, perceptions, emotions, behaviours, and relationships with others. Mental disorders include depression, bipolar effective disorder, schizophrenia and other psychoses, dementia, intellectual disabilities, and developmental disorders including autism.[34]

*Burden and trends*

***Non-communicable diseases.*** Increases in life expectancy and lifestyle and environmental changes partly explain the increase of the burden of NCDs. By 2012, NCDs were responsible for 68 per cent of global mortality with more than 40 per cent of the 38 million deaths from NCDs occurring prematurely (younger than age 70) (WHO, 2014a).

The majority of cases of NCD-related mortality before age 70 is due to cardiovascular conditions including ischaemic heart disease, followed by cancers (Figure 1.9). Both groups of conditions have a link to environmental and lifestyle risk factors, including the harmful use of alcohol, physical inactivity, tobacco use, unhealthy diet and overweight/obesity. Additionally, biological risk factors include raised blood glucose, high blood pressure and raised cholesterol.

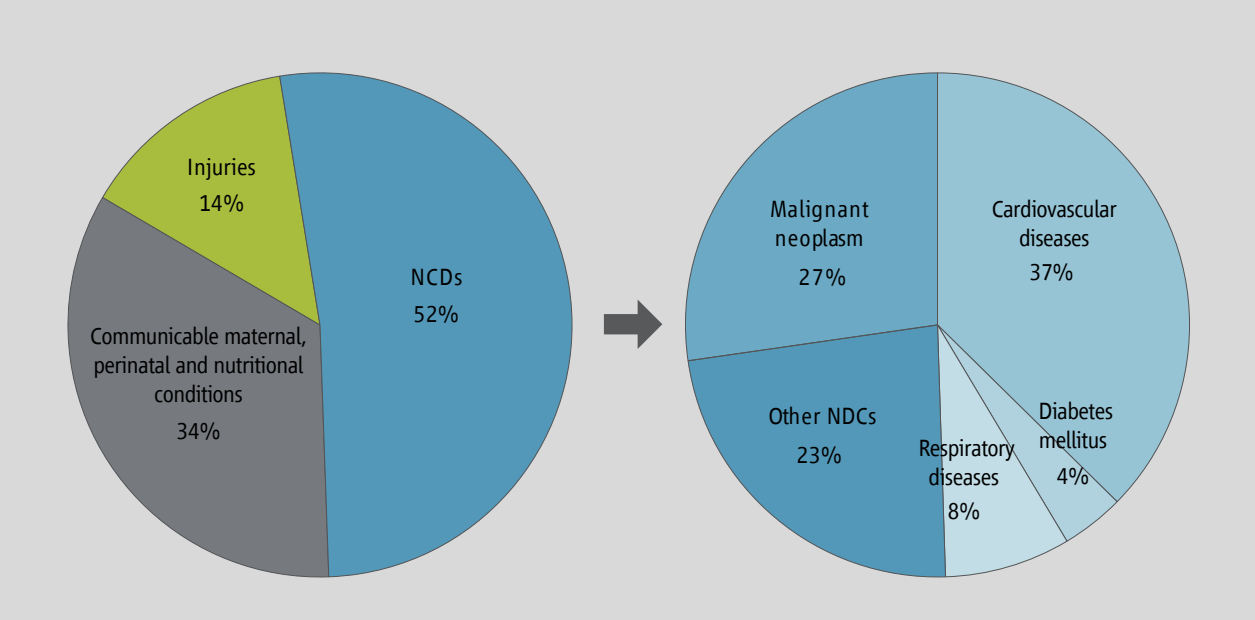
A common perception is that the burden of NCDs is a "rich country" issue. This is far from the reality. While developed and high-income countries have experienced great health gains and higher life expectancy, the burden of NCDs remain highest in low- and middle-income countries. The WHO global status report 2014 on NCDs notes that "almost three quarters of all NCD deaths (28 million), and the majority of premature deaths (82 per cent) occur in low- and middle-income countries" with over 20 million NCD deaths in 2015 in the South East Asia region and the Western Pacific, over 50 per cent of the global figure (Figure 1.10).

The higher number of NCD cases in low- and middle-income countries is not the only problem associated with this burden. Unlike for high-income countries, for these countries the increase in life expectancy has happened rapidly. This increase has gone hand in hand with incomplete social security coverage, a lack of preparation for and prevention of the causes of disease in older age, and the absence of medical infrastructure and capacity to address ageing populations.

As a result, in low- and middle-income countries it is much less likely for older populations with NCDs to have affordable and equitable access to health care when they need it, despite the predictability of such a need.

33. See <http://who.int/topics/noncommunicable_diseases/en/>.
34. See <http://who.int/mediacentre/factsheets/fs396/en/>.

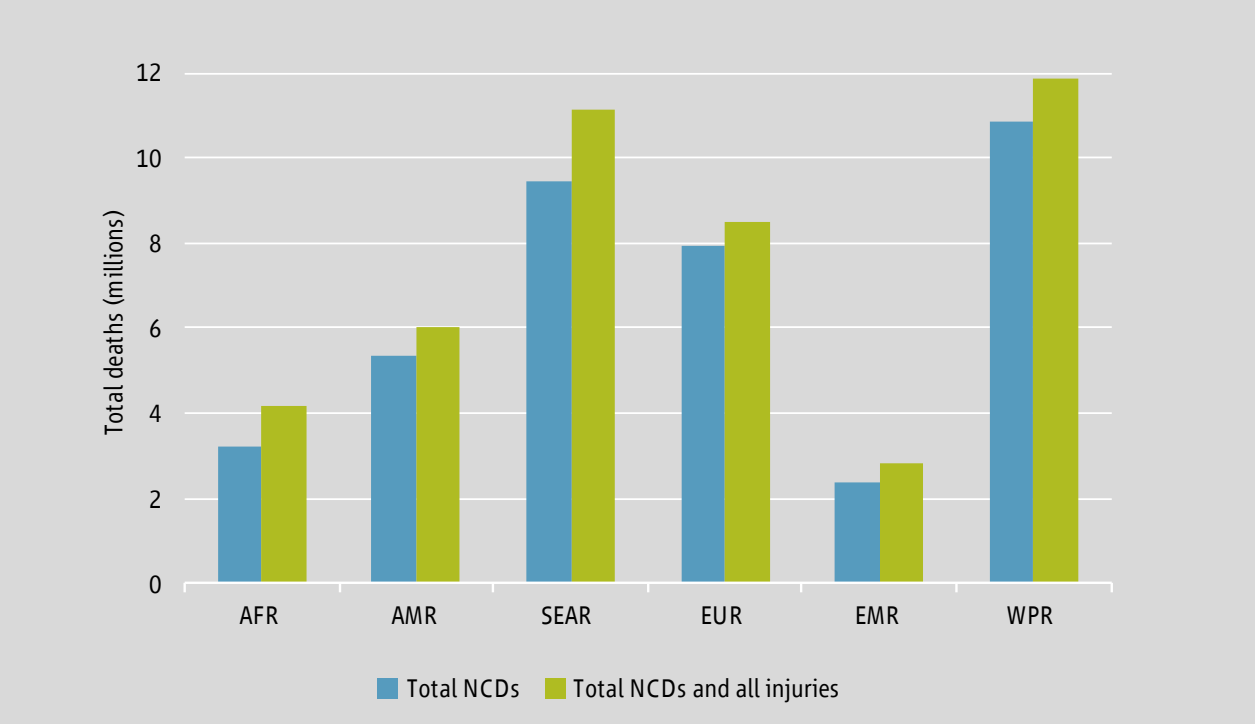
**Figure 1.9.** *Proportion of global NCD deaths younger than age 70, by cause of death, 2012*




*Note:* Figures are rounded.

*Source:* WHO (2014a).

**Figure 1.10.** *Total deaths by broad cause group, by WHO region, World Bank income group, 2013*




*Note:* AFR=African Region; AMR=Region of the Americas; SEAR=South-East Asia Region; EUR=European Region; EMR=Eastern Mediterranean Region; WPR=Western Pacific Region.

*Source*: WHO WHO (2015b).

***Mental health disorders.*** The mental health burden has also increased in recent decades. Mental disorders account for about 12 per cent of the global burden of disease.[35] Mental and substance use disorders are the leading cause of Years Lived in Disability worldwide. The burden of mental and substance use disorders increased by 37.6% between 1990 and 2010.

In particular, the health burden of mental disorders lies with young adults in their most productive years. Projections suggest that developing countries are likely to see a disproportionate increase in mental disorders in the coming decades.[36]

The World Health Organization estimates that one in four people "will be affected by mental or neurological disorders at some point in their lives"[37] with around 450 million people currently suffering from such conditions.

Additionally, and to make matters more precarious, nearly two-thirds of the people with a known mental disorder never seek help from a health professional due to "stigma, discrimination and neglect", thus preventing care.[38]

The economic burden of mental disorders is significant. In the United States alone, the cost of direct treatment amounted to 2.5 per cent of the GNP. This does not include the indirect costs, which include lost productivity, the value of which are greater in some estimations than the direct treatment costs.[39] Some of the most common mental disorders are depression, bipolar effective disorder, schizophrenia and other psychoses, dementia, intellectual disabilities, and developmental disorders including autism.

Depression, one of the most common and widespread mental disorders, is a useful example. This illness presents with symptoms including depressed mood, loss of interest of pleasure, decreased energy, feelings of guilt and low self-worth, disturbed sleep or appetite, poor concentration and, in some cases, anxiety. It can become chronic or recurrent, and can affect the patient's ability to lead a normal life (WFMH, 2012).

Suicide can result from severe depression. On average, there are over 800,000 suicides per year. It is not possible to measure the number that are attributable to depression, but in the majority of cases it is generally assumed to have played a role.[40]

In their 2004 statistics, the World Health Organization calculated the age-standardized DALYs per 100,000 persons by cause and by country. The findings show that the highest prevalence of unipolar depression was found in the United States, Nepal, East Timor, Bangladesh, India, Pakistan, Brazil, the Maldives, Bhutan, Afghanistan, and Finland; the lowest was in Japan, Spain, Greece, Côte d'Ivoire, Portugal, Uganda, Kenya, Ethiopia, Republic of the Congo, Botswana and Zambia.

Moreover, there are gender differences in the prevalence of depression (Kuehner, 2003) that show female preponderance across cultural settings. A more recent survey of the Global Burden of Disease (Murray et al., 2012) has shown that DALYs because of unipolar depressive disorder have increased between 1990 and 2010 in total by 37.5 per cent (from a global 54,010 to 74,264 DALYs). Even when looked at per 100,000 of the population, the increase is still a significant 5.8 per cent (from 1,019 to 1,078 DALYs/100,000).

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35. See <http://www.who.int/mental_health/policy/essentialpackage1/en/>.
36. See <https://www.ncbi.nlm.nih.gov/pubmed/23993280 >.
37. See <http://www.who.int/whr/2001/media_centre/press_release/en/>.
38. See <http://www.who.int/whr/2001/media_centre/press_release/en/>.
39. See <http://www.who.int/mental_health/policy/essentialpackage1/en/>.
40. See <http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/>.

### 1.2.4. Responding to the challenges

The critical importance of a concerted effort to respond to the challenge of NCDs is clearly stated in the *WHO Global status report on noncommunicable diseases 2014* (WHO, 2014a), in which the first message highlights the role of NCDs as a key barrier to poverty alleviation and sustainable development. Many countries still have a long way to go to meet the global NCD targets, despite the existence of priority, affordable and high impact interventions. The increasing burden of NCDs and the resulting exponential increasing impact on health care and social security systems mean that responding to this challenge becomes more complicated as time progresses (Daniels, Donilon and Bollyky, 2014).

A multifactorial response is required to address the burden created by NCDs, involving: disease prevention (including risk factor control) and management; an enabling political, social, economic and medical environment; and attention to palliation and end-of-life care. Proven cost-effective interventions for specific diseases include public health preventive measures and simple treatment components.

***WHO Global Action Plan for Prevention and Control of NCDs 2013–2020***. The WHO Global Action Plan (GAP) for the Prevention and Control of NCDs 2013–2020 provides a road map and policy options for countries to strengthen their efforts to address the burden of NCDs. Nine voluntary global targets include a 25 per cent relative reduction in NCD-related premature mortality by 2025.[41] The six objectives of the plan cover areas including strengthened governance, prevention, health system response, and research and monitoring. The GAP targets address mortality/morbidity, behavioural risk factors (smoking, alcohol, salt and fat intake), biological risk factors (raised blood pressure, raised cholesterol, diabetes and obesity) and national system responses (access to technologies and treatment).[42] There is also a 6-target WHO Global Mental Health Action Plan 2013–2020.[43] This has four major objectives (encompassing leadership and governance, community-based responses, mental health promotion and prevention, and strengthening of information systems, evidence and research for mental health), with one or two targets for each, and related indicators.

***The role of policy***. *The WHO Global status report on non-communicable diseases 2014* elucidates the benefits of implementing proven select cost-effective interventions to prevent and control NCDs. There are various targets for health policies to decrease NCD-related population risk and individual susceptibility. Some of these are afforded the status of "best buys", since they are very cost-effective, high-impact, and feasible for implementation even in low resource settings. One of the most obvious targets for strong policy and legislative action is smoking, with potential high impact on NCDs including cancer, chronic lung disease and cardiovascular disease (the number one global killer). The WHO Framework Convention on Tobacco Control (FCTC),[44] an unprecedented global health treaty, entered into force in 2005 and has 180 Parties. It is one of the first multilateral binding agreements regarding a chronic NCD, and lays out specific steps for governments to address tobacco use, including the production, sale, distribution, advertisement and taxation of tobacco.

Other policy targets to address the prevention of NCDs include the regulation of food products, including salt and trans fat content of foods, and alcohol availability, cost and promotion. Sectors other than health have important roles to play. Transport, urban planning, recreation, and sports and education departments, for example, can have an impact on the promotion of physical activity.

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41. See <http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf>.
42. See <https://www.idf.org/sites/default/files/GMF_Final%20Table%20of%20Targets.pdf>.
43. See <http://www.who.int/mental_health/action_plan_2013/en/>.
44. See <http://www.who.int/fctc/en/>.

***The role of the private sector.*** Countries should consider the benefits of private-sector engagement in the response to NCDs. These may range from the commitments of food and beverage companies to adhere to regulations on food content or to companies promoting healthy behaviours for employees, to the development of new supporting technology such as simplified medical diagnostics, treatment and information systems.

***Prevention.*** Many NCDs share common risk factors (smoking; dietary factors such as salt, fat and alcohol intake; and physical inactivity), meaning that addressing these has multiple potential benefits. As well as other policy responses mentioned, an appropriate response includes public health programmes to promote awareness and lifestyle modification. Programmes for hepatitis B vaccination and for cervical cancer screening are important for liver and cervical cancer prevention respectively. Secondary prevention of cardiovascular events is also possible – taking the appropriate combination of medications can achieve a two- to three-fold reduction in the occurrence of strokes and heart attacks in those with a previous event; yet even in high-income countries, rates of patients on recommended regimes remain sub-optimal to low. Increasingly recognized is the role of workplace health promotion as a promising way to reduce lifestyle-related health risks and to improve the employability of workers with chronic illness. However, the workplace is also an important contributor to the prevalence NCDs such as cancer, cardiovascular diseases and mental illnesses amongst workers. The ILO estimates that occupational diseases, dominantly NDCs, cause no less than 85 per cent of all work-related fatalities. There is an urgent need for the traditional focus on safety risks that result in work accidents to shift also to health risks and work-related diseases. Required is a more holistic prevention approach addressing both work and non-work related risk factors.

***Disease management.*** Preventive policies and programmes are just one component of an effective response to the NCD burden. Adequate disease management is another component that plays an important role in preventing premature mortality and debilitating morbidity, and in decreasing the extent of patient need by maximizing disease control. The provision of acute care is the key focus of many health systems. These systems need to be shaped to more effectively provide chronic care, including risk factor and disease identification, essential investigative capacity, health education, and long-term patient follow-up. Lessons from, and harmonization with, existing systems for HIV care have proved beneficial in some situations, but in low- and middle-income country settings NCD care often lags behind HIV care in terms of availability, affordability and reach. Cancer management remains expensive in most cases and prevention and early detection become more important in contexts where resources do not allow for comprehensive treatment.

***Drug availability.*** For many NCDs and risk factors, drugs exist which are effective, off patent and inexpensive. This is certainly the case for hypertension management, which is important for the prevention of cardiovascular disease, for access to other cardiovascular prevention drugs, and for diabetes treatment. The availability and affordability even of essential NCD drugs remains an issue in low-income country settings.

***Palliative care.*** Cancers, cardiovascular disease and renal impairment are some of the NCDs that may eventually reach terminal stages, and a health system response to these should incorporate capacity for end-of-life and palliative care, such as pain relief and nursing care. Opioid analgesic availability remains difficult in some contexts, but is included as an indicator in the WHO global NCD action plan 2013–2020.

***Mental health care.*** Efforts to address the burden of NCDs should include mental health care, without which the cost and effectiveness of the NCD response is compromised (Daniels, Donilon and Bollyky, 2014). Patients with mental illness are more likely to be smokers, obese, and to suffer multiple non-communicable diseases. By inference, NCD patients have increased rates of mental health issues. Response efforts should include public health programmes to increase awareness and decrease stigma. Also required are systems for the management of people's health, including various levels of counselling, and the availability of medication. Primary health care provisions have successfully integrated mental health care in various settings; this can allow the harmonious provision of simultaneous mental health and NCD care. There are increasing numbers of examples of community-based mental health programmes in low-resource settings, potentially facilitating the increased availability of mental health care, as well as locally adapted responses.

## 1.3. Looking ahead

This section has analysed some of the likely future trends in respect of mortality and morbidity and has focused on the trends likely to have the most impact on social security systems in the design, financing and delivery of benefits. While the overall impact of longer life expectancy is positive for individuals and society,[45] the variation of outcomes, multimorbidity, increases in mental health cases and in non-communicable diseases, and the importance of unhealthy life expectancy for society as a whole and for social security institutions in particular is of note. A key theme running through the trends analysed is that the past evolution of trends is not necessarily a good indicator of what is likely to happen in the future; hence the importance of analysing the underlying factors influencing mortality and morbidity. An example of these new underlying factors is the impact of climate change and natural resource scarcity.

**Box 1.3.** *Climate change and natural resources scarcity – impacts on mortality and morbidity*

Climate change will have significant impacts on society in the decades ahead. However there is uncertainty regarding the nature of such impacts and the same is true of the evolution of mortality and morbidity. As the planet warms, there are likely to be increases in certain diseases. With temperatures 2 to 3 degrees higher than pre-industrial levels (Hallegatte et al., 2016), the number at risk of malaria will increase by some 5 per cent or 150 million. In addition, there will be both direct and indirect impacts relating to the increasing number of extreme events and the resulting environmental degradation. Deaths will increase from heat stress (for example in 2003, during the European heat wave, there were an additional 70,000 deaths), diarrhoea (an estimated 48,000 additional deaths for children younger than age 15) and malnutrition. Flooding and storms but also increasing droughts are putting larger parts of the population at risk and the number in poverty is likely to increase by some 100 million. Conversely, measures to reduce greenhouse gas emissions, such as a reduction in meat eating, a transition to renewable energy and encouraging exercise, will reduce mortality rates. There are over half a million premature deaths per annum due to air pollution in India (Kazmin, 2015); a switch to clean energy and away from the use of coal is likely to make a serious dent in this number. Increasing natural resource scarcity is arguably likely to have an even greater impact with significant parts of the population subject to water stress (by 2030, water supplies will only satisfy 60 per cent of global demand)[47] with related increases in illnesses and poverty.

45. For example, increased life expectancy raises the savings rate and reduces consumption in the short run, but boosts the economy through an accumulation of capital, which encourages consumption in the long run.

46. See ISSA (2014b), citing <www.mckinsey.com/App_Media/Reports/Water/Charting_Our_Water_Future_Full_Report_001.pdf>.

This section has discussed the factors that have led to improved life expectancy. In the next chapter, we look at the challenges of predicting and quantifying future trends to enable financial planning. Understanding the factors driving these trends not only improves forecasting, but also assists policy-makers in choosing the appropriate actions and measures to address them. The challenge is to assess which trends are likely to continue and to what extent. Consideration of variations by region is also required.

# 2. Quantifying trends

Assia Billig and Simon Brimblecombe

This chapter highlights the difficulty of quantifying accurately the key demographic trends and changes and translating these into appropriate assumptions for use in the planning, costing and financing of social security programmes.

The major challenge faced by policy-makers and social security administrations is how the impacts of future – and, therefore, difficult to determine precisely – mortality and health trends might direct necessary changes in social security programme design, sustainability, benefits adequacy and administration. Further, these trends are difficult to forecast because past experience is not necessarily predictive of the future. In developing assumptions with respect to future mortality and morbidity, the social security administration should strive to achieve the most realistic assumptions. Such an approach implies that, on the one hand, the allocation of programme funds is sufficient, and, on the other hand, there is no overestimation of funds leading to unjustified intergenerational transfers and/or reductions in some benefit levels. In order to do this, what is required is an assessment of the extent to which past developments will evolve in the future and how emerging trends might develop, some projections of which this report highlights.

## 2.1. Data and definitions

A key challenge in making certain that appropriate assumptions are used to project the future evolution of mortality and morbidity is to ensure that population and programme data are reliable, accurate, up to date and useable and can therefore be used to develop assumptions about the future.[47] A difficulty highlighted by the WHO is that there are still gaps in country-specific data. In line with the United Nations Sustainable Development Goal's emphasis on equitable development, the WHO states, "there is a need for a much greater disaggregation of data, including statistics disaggregated by sex, age, income/wealth, education, race, ethnicity, migratory status, disability and geographic location, or by other characteristics, in order to identify and track disadvantaged populations within countries" (WHO, 2016).

The calculation of life expectancy normally uses national statistics of the number of deaths by age and gender. With national data accurately measured, life expectancy should offer an accurate indicator of how long a population will live on average. In respect of social security programmes that do not cover the whole population, using population data is likely to underestimate life expectancy and overestimate morbidity for those covered in a social security programme. Those not covered in a social security programme (typically informal economy workers or those working in professions not covered) will generally have worse mortality and health outcomes than those covered. The implication of this is to potentially underestimate some costs (e.g. of a retirement system) and overestimate others (e.g. health costs), which in turn can lead to inappropriate financing decisions and intergenerational cross-subsidies. Conversely, in the expansion of social security programmes to previously uncovered population groups, using programme data may overestimate retirement system costs but underestimate health system costs for the new population groups covered.

47. See Part A of ISSA-ILO Guidelines for Actuarial Work (ISSA and ILO, 2016).

The setting of assumptions regarding the future health status of a population is more complex than mortality assumption setting due to the subjective nature of health status, the use of differing definitions and the recording of data. To assess the state of health of populations, national and international bodies use several measures. These measures aim at combining age-specific and sex-specific measures of both morbidity and mortality into a single statistic. Some of the common concepts are healthy life expectancy (or health adjusted life expectancy), healthy years without disability, and health years without activity limitations. Care is required when comparing health measures calculated by different agencies, given that the same terminology may define different concepts. Further, because these measures are based often (fully or partially) on self-reported health status data, the ways the data are collected and questions asked may differ.[48]

Other possible concerns are how well self-reported health reflects the actual health status of an individual and whether there are differences in accurate health self-perception among different subpopulations. A 2015 Norwegian study (Holseter et al., 2015) found that the relationship between self-reported health status and mortality outcomes is equally strong across different occupational classes and income groups. These findings increase the credibility of population studies that use self-reported health measures.

Finally, it is important for social security administrations to differentiate between the severity of health problems and their impacts on the ability of people to work (impacts on disability programmes), perform daily activities (impacts on long-term care programmes), and on the amount of health care required.

## 2.2. Regional variations will remain

Despite an expectation amongst some experts that increasing globalization would lead to a more uniform worldwide distribution of outcomes (including income and health), mortality and health levels among countries still differ significantly (one reason is that inequality within countries has increased). An eventual reduction in costs and increases in accessibility to medication and medical procedures may provide a positive impulse for convergence in mortality and morbidity. Regardless, demographic, economic and cultural differences are most likely to continue to play an important role. In addition, a number of geo-political factors, such as armed conflicts, events caused by climate changes, the emergence of new diseases concentrated in particular regions, and migration flows,[49] will differ widely.

Identifying the main reasons for the difference in mortality and morbidity experiences between countries is an important exercise that not only improves projections but also strengthens policy development. An example of such analysis is a report entitled "Explaining divergent levels of longevity in high-income countries" (Crimmins, Preston and Cohen, 2011). This report examines the impacts on longevity of factors such as obesity, physical activity, smoking, social integration, health care, hormone therapy and inequality. One of the report's conclusions underlines the high risks associated with obesity, the lack of physical activity and smoking. Interestingly, these three risk factors are the ones where preventive policies could be highly effective.

48. International agencies such as Eurostat pursue a number of initiatives aimed at harmonizing health status reporting in European countries and improve comparisons.

49. The impact of migration on health is a complex topic not explored in this report.

Indeed, many of the trends highlighted in Chapter 1 of this report will more adversely influence less developed countries compared to high-income countries. Rates of diabetes are increasing much more rapidly in developing regions than in OECD countries.[50] However, the proportion of deaths related to cancer remains higher in high-income OECD countries.

For countries with significant levels of immigration, it is unclear whether the different profile and characteristics of migrants will significantly affect the overall mortality and health status of the nation. This is because the profile of migrant workers is a subset of the country of origin, but not in itself fully representative of the country of origin population experience.

## 2.3. Assessing differences by socio-economic group

Section 1.2 highlighted that the rates of mortality and morbidity vary significantly according to socio-economic status. The important question affecting social policies is the relative evolution of these rates, i.e. is there convergence or divergence observed between socio-economic levels?

A number of studies have addressed this question in several countries, including the United States and the United Kingdom. The evidence presented in these studies often depends of the metrics used (how socio-economic levels are defined, data used, etc.). In United States, a recent study states that "There has been a significant decline in the risk of dying from cancer or heart conditions for older Americans in the top half of the income distribution, but we find no such reduction of mortality risk in the bottom half of the distribution" (Bosworth, Burtless and Zhang, 2015). The study concludes that inequality in mortality in the United States is increasing for cohorts that are more recent. Bosworth and Zhang (2015) also conclude that inequality has risen using midcareer income and education as the socio-economic indicator and Meara et al. (2008) and Olshanky et al. (2012) in earlier studies come to the same conclusion.[51]

The extent of a convergence or divergence of mortality and morbidity rates by socio-economic level in a country is often attributed to a decrease or increase in inequality as well as to changes in behaviour at different socio-economic levels. Some other contributing factors are changes in:

- access to timely and quality medical services;
- degree of exposure to environmental factors (e.g. living near busy roads and the resulting pollution exposure);
- reliability of access to affordable nutrition;
- employment status;
- level of physical activity; and
- policies including the promotion of preventive medicine, access to proper vaccinations, and anti-smoking and anti-drug campaigns.

50. While globally the number of diabetes is expected to increase by around 50 per cent, from 415 million today to 642 million in 2040, the numbers are expected to more than double in the Middle East and Africa compared to a less than 20 per cent increase predicted in Europe; <http://www.idf.org/about-diabetes/facts-figures>. Already three-quarters of case arise outside Europe and North America.

51. See also <http://www.oecd.org/daf/OECD-Business-Finance-Outlook-2016-Highlights.pdf>.

**Box 2.1.** *Experience analysis – input into assumption setting*

A key element of setting appropriate assumptions for the future development of trends is to assess how historic estimations have turned out in practice. For example, predictions regarding mortality made in 1980 for the year 2000 are quantifiable against the reality. At a system level, a valuation of the programme should seek to explain how the financial situation has changed since the previous valuation and should look at the evolution in financial factors and at assumed mortality and morbidity rates against observed experience. Such considerations should feed into the assumptions used for future valuations and into the decision-making for benefit design, financing and delivery (ISSA and ILO, 2016).

Monitoring the level and evolution of the relative mortality and morbidity rates of subpopulations is critical because any changes affect the provision and utilization of social programmes, such as health, retirement and disability. Such evolution is also important when assessing the financial sustainability of social security programmes (Box 2.1).

## 2.4. The role of actuaries and demographers

Actuaries have an important role to play in the analysis of past experience and in determining assumptions regarding future developments. This analysis will be used directly to make decisions regarding the future financing and benefit design of systems (Box 2.2.), but also investment decisions, the choice of risk management tools and the calculation of benefit entitlements.[52,53]

**Box 2.2.** *Reviewing the social security pension age*

Actuaries' input is often mandated in the determination of a normal retirement age based on estimates and projections of life expectancy. This may be to advise or define appropriate retirement ages (e.g. for systems whose aim is for the period of retirement to be equivalent to a proportion of working life), for the determination of automatic adjustment mechanisms and/or the assessment of the impact of changes on different income and social groups. For example, in the United Kingdom, the Secretary of State requires the Government actuary to report on the pension age. Specifically sought is whether the current retirement age still meets the aim that pensioners spend a specified period, defined as a proportion of their previous working life, in retirement, and if this is not the case to propose changes to the retirement age needed to meet this objective. The findings of the first review are due in mid-2017. However, the importance and relevance of a unique "normal" retirement age is reducing as employment patterns change, part-time work is being encouraged and there are increasing incentives for later retirement. Some systems have formally moved away from a normal retirement age to a flexible window of retirement age options. This in turn makes the measure of the "dependency ratio" subject to caution, as the concept is becoming less relevant with the move away from one "cut off" age for retirement and the prevalence of part-time work at older ages.

While the role of actuaries is likely to grow in line with need of policy-makers, stakeholders, social security institutions and the public for relevant information in order to make appropriate decisions, it is essential that this information is as far as possible publicly available and clear. For example, any decision to the increase retirement age in the United Kingdom depends on regular actuarial analysis of the evolution of

52. This chapter focuses on actuaries working in social security, but life and general insurance actuaries (and others) are also assessing mortality and morbidity developments.

53. Actuaries, through national associations as well as through the International Actuarial Association (IAA) are able to provide policy-makers and social security administrations with analyses that assess past and future trends from wider economic, demographic and societal points of view. Some examples are the work carried by the IAA working groups, such as the Mortality Working Group, see <http://www.actuaries.org/index.cfm?lang=EN&DSP=CTTEES_TFM&ACT=INDEX> and the Population Issues Working Group <http://www.actuaries.org/index.cfm?lang=EN&DSP=CTTEES_PIWG&ACT=INDEX>.

life expectancy, which is publically available. This creates a clear link and justification regarding the basis for policy decisions, and is more likely to convince populations. The information disclosed, including the assumptions used, also informs the population regarding the basis of calculation.

## 2.5. Future developments

Future improvements in mortality are unlikely to mirror the past, simply because of the prior achievement of the "easy" gains and, perhaps more significantly, due to the causes of death having significantly changed over recent decades (see Figure 2.1). The emerging causes of death, identified in this report, will arguably be more difficult to address, most notably diabetes and cancer. In the United States, the three risk factors that account for the most disease burden are dietary risks, tobacco smoking, and high body-mass index.[54] In Europe in 2012, 37.9 per cent of all deaths (1.9 million deaths) resulted from diseases of the circulatory system, and cancer-related deaths accounted for 25.8 per cent of the total.[55] Fundamental changes to how society addresses emerging health challenges are necessary but there is little evidence of such a shift yet. There is still greater focus on ex-post actions, whereas ex-ante actions are typically more cost effective. One issue is the challenge of carrying out a cost-benefit analysis of such measures: it is not easy to isolate the cost of ex-ante measures and their benefits through health care savings and productivity improvements – because there are a number of other factors that affect changes in mortality and morbidity experience. Further, financing for such studies often does not exist, in contrast to studies seeking to assess the impacts of medication and other ex-post measures. Governments, often focused on the short term, face the challenge of making legislative changes in areas that may negatively affect employment in important sectors of the economy in the short run, as well as sectors dominated by large corporations that may be "national champions". When applied, however, the results achieved from measures taken are positive. Examples include a soda tax in a number of countries,[56] the promotion of physical exercise, and also a move from fossil fuel to renewable energies, the latter creating a number of indirect jobs which cannot be delocalized (e.g. installing solar panels).[57]

In fact, one of the interesting conclusions for trends in mortality is that globalization does not always lead to convergence. In identifying future trends for particular countries, a number of cultural and lifestyle factors are expected to play an important role, particularly for ageing populations. In this regard, it is instructive to look at the causes of death at older ages in Canada, France and Japan. These countries reflect distinctively different lifestyles and cultures and have some of the highest life expectancies in their respective regions. Figure 2.1 shows the main causes of death for ages 85–89; heart disease (despite dramatic past improvements) and cancer are the two main causes of death, with Japan showing significantly lower mortality rates from heart diseases. Thereafter, there is considerable divergence in the importance of various causes of death. For example, for Japan, the third most important cause of death is "influenza and pneumonia", important enough to outweigh low mortality rates from heart disease and cancer compared to both Canada and France. One of the reasons is the increase in the number of people residing in nursing homes and worse outcomes for these people as regards to pneumonia. Overall, however, Japan has the lowest mortality rates for this age group.

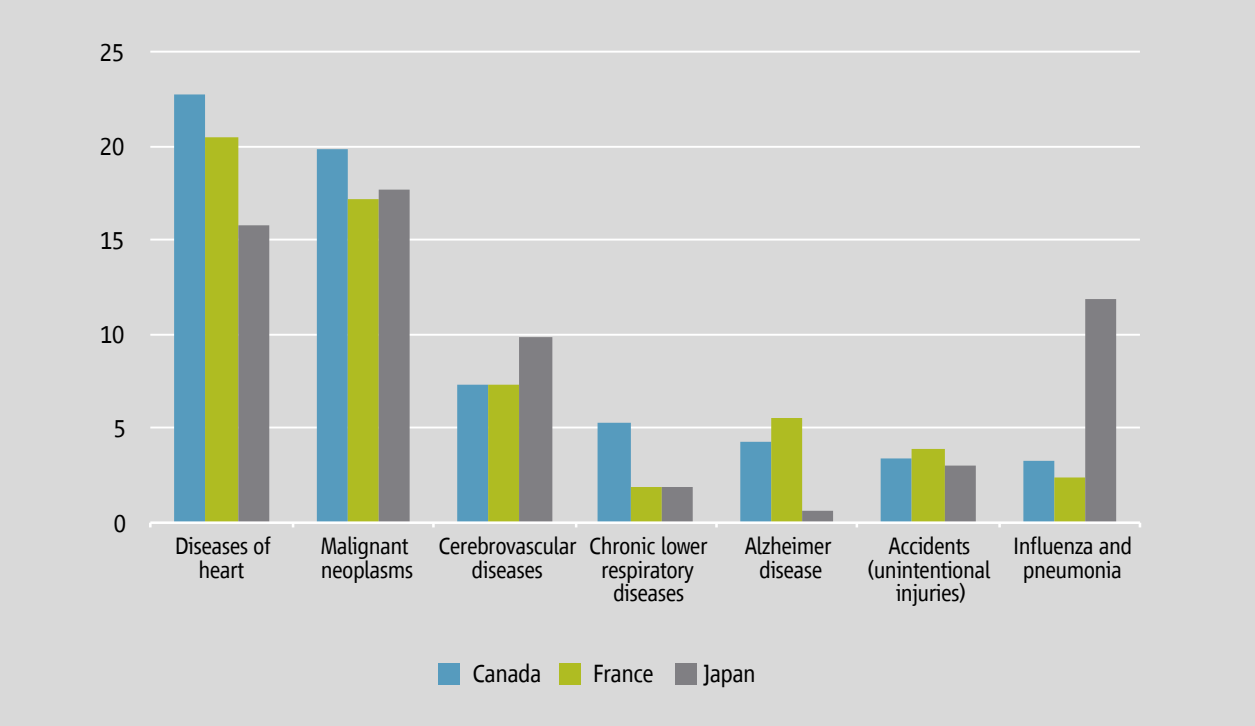
54. See <http://www.healthdata.org/>.

55. See <http://ec.europa.eu/eurostat/statistics-explained/index.php/Cardiovascular_diseases_statistics>.

56. Annual sales of sodas in Mexico declined 6 per cent in 2014 after the introduction of the tax. Research estimates that a penny per ounce tax on sugared beverages could prevent 240,000 cases of diabetes per year, and 8,000 strokes and 26,000 premature deaths per decade in the United States <http://www.npr.org/sections/thesalt/2012/01/12/145112865/could-a-soda-tax-prevent-26-000-deaths-per-year>.

57. See the example of Bangladesh in ISSA (2014b).

**Figure 2.1.** *Main causes of death for ages 85-89, both sexes by percentage of total deaths, 2011*




*Source:* WHO data and calculations by the Office of the Chief Actuary, Canada (unpublished).

Ageing may mean significant shifts in the exposure of older people to certain diseases. Two notable examples are cancers and Alzheimer's disease. In the United Kingdom, more than 75 per cent of all people diagnosed with cancer are older than age 60 (Maruyama et al., 2010). Increasing life expectancies in combination with better survival rates may result in a significant increase in the cost of cancer treatment and there is even greater uncertainty with respect to treating Alzheimer's[58] For example, based on WHO data, between 2000 and 2011, mortality rates from Alzheimer's for ages 85–89 doubled in France, Italy, Spain and Sweden, and increased almost six-fold in Finland with mortality rates similar to those from cancer.[59] While absolute numbers of deaths are still small, and some of this increase is probably attributable to changes in recording the cause of death, this dynamic could give an indication regarding increasing numbers of elderly requiring prolonged periods of intensive care. Another uncertainty is the impact of medical research on not only mortality rates for Alzheimer's and cancers but the quality of life of those diagnosed with these illnesses.

The impact of such changes on health and retirement systems will be significant and complex. Ageing is one factor in increasing health costs, as are rising unit costs, medical technology, care costs and other health system developments. However, there is a clear correlation of not only age and health costs, but also the number of lifestyle-related health risks a person faces and health care costs (Edington, 2009). While health costs for those aged 65+ are around three to four times higher than for those younger than age 35, health costs for a person exposed to 0-2 health risks are lower, at around 30–40 per cent of the costs, than for a person of the same age exposed to five risks or more. This shows the potential of preventive and proactive measures for both social security administrations and employers.

58. See <http://scienceblog.cancerresearchuk.org/2015/02/04/why-are-cancer-rates-increasing/>.
59. WHO data and calculations by the Office of the Chief Actuary, Canada (unpublished).

# 3. Impacts and responses of social security

Simon Brimblecombe

Whereas chapters 1 and 2 identified and assessed key future trends, this chapter looks at the key impacts of these on social security systems and the responses that policy-makers and social security administrations can take to mitigate their negative impacts and even to reverse or slow down these trends. The discussion analyses each of the key trends as well as their general and branch-specific impacts on social security systems before highlighting exemplar national responses.

While some of the demographic trends identified appear to lend themselves to parametric changes (e.g. the response to longer life expectancy is to increase retirement age), the unequal outcomes outlined in the previous chapters suggest that a systemic review is necessary to ensure that optimal responses are developed. This means that the parametric changes deemed relevant, such as increasing the normal retirement age, have the support of other measures to ensure they achieve the required results without creating new gaps in coverage. Not only will enacted changes will influence the social, economic and labour market context in which social security systems operate, but the measures needed may be more effectively provided through a new way of benefit and service provision. At the heart of the matter, the labour market is likely to look very different in the future (ISSA, 2013 and 2016), with less fixed notions of the ages at which a working career may start and end, a weakening of the employee-employer relationship, and more frequent changes in career.

The examples in the chapter sit in the broader context of the need for the fundamental structural reform of social security systems. Of importance, a number of the measures referred to address challenges arising from many of the different trends identified.

## 3.1. Increases in life expectancy

### 3.1.1. General impacts

- The fact that people are living longer implies that benefits will be payable for longer if no other changes are made to social security systems. This has financing implications for not only retirement systems but for health care and disability benefits.
- The nature of illnesses changes with age. Therefore with increasing numbers of older people, the distribution of different illnesses will change (while over 50 per cent of deaths at age 35 in low-income countries are due to communicable diseases, for those aged 50–70 the biggest killer is non-communicable diseases, and at age 70+, the biggest killer is cardiovascular diseases (Beard et al., 2015). Moreover, at older ages, these illnesses are often more costly to treat, require new preventive intervention skills and last longer than illnesses affecting younger aged populations (for example, dementia and Alzheimer's disease).
- With a move to higher retirement ages, managing unemployment at older ages and ensuring interaction and coordination between retirement, disability and unemployment programmes becomes important. A goal should be to avoid unilateral changes to improve the sustainability of retirement systems – all changes should consider the increases in costs for other branches.

- The distribution of increases in life expectancy is not equally through the society – so the move to higher retirement ages should consider the impacts on different sub-groups and mitigation strategies should be part of the reform package.
- Active ageing policies are increasingly important to ensure that older workers can remain at work and contribute actively to the economy. This is also important to maintain the contribution base and respond to ageing populations in many countries.
- As people live longer, benefits and services from other sources may diminish over time (e.g. second and third pillar retirement benefits) thereby leading to increasing demands for social security support. This has been exacerbated by the monetary policy seen over the last decade, which has led to significantly lower annuity rates and, in systems where part or all of the accumulated fund can be taken as a lump sum (e.g. United Kingdom, Switzerland, France), a very challenging environment for pensioners to secure an adequate income from their fund.
- As highlighted in Chapter 1, overall life expectancy has increased, but the number of years of healthy living has increased at slower pace. Therefore, there is a need for the longer provision of health care and for the provision of other supporting mechanisms. This is challenging, as the quality of the unhealthy years varies. For example, the number of years lived with an assessed disability may increase, but the severity of the disability and the quality of the supporting care and treatment will influence the perceived quality of life.
- Although health care costs tend to increase with age, the actual relationship depends greatly on the nature of the health system plus family structures and cultural norms. In addition, the nature of medical costs change. In a UK study, expenditures increased with age, but costs related to acute and elective admission to hospital fell at older ages after a peak for those aged 65-74 (Oliver et al., 2014). Therefore, to be considered are the global costs of different interventions. For example, in the Netherlands, better health in early ages seems to be associated with lower hospital costs for the remaining lifetime, but also with higher long-term care expenditure (Wouterse et al., 2013).
- For developing countries where birth rates remain high, increases in life expectancy due to the reduction in youth mortality may lead to higher youth unemployment and underemployment. The response requires accompanying education and labour market policies.

### 3.1.2. Examples of policy and administrative responses

A number of social security systems have responded to the higher projected costs associated with longer life expectancy by increasing retirement ages and tightening eligibility conditions for full pensions (e.g. Spain). In the OECD, the retirement age of males entering the labour market at age 20 will increase from 64 years today to 65.5 years by the end of the 2050s (OECD, 2016b). Many countries (e.g. Belgium, Canada, Germany, and the Netherlands) are increasing or plan to increase the retirement age to 67 or 68 years. Others have linked future increases in the pension age with increases in life expectancy (e.g. United Kingdom) or have linked the contribution requirements for a full pension to increases in life expectancy (e.g. France).

However, such measures are only effective when coordinated with other branches of social security (in particular with disability, occupational safety and health, and unemployment protection, and with health measures) and appropriate employment policies such as active ageing policies (IAA, 2016). Such measures, if applied uniformly, may negatively affect those in professions that are physically demanding and where

working extra years at older ages may simply not be possible (OECD, 2015). An important consideration relates to the increasing care commitments undertaken by those close to the normal retirement age. Such commitments affect retirement age choices as well as possibilities in the employment market. Retirement systems that are more flexible in both the setting of parameters (e.g. a retirement age related to both age and service, or with additional credits for those with care responsibilities) and as regards when and how benefit are paid (e.g. partial retirement)[60] are needed. Although flexibility can help responses to challenges, also required are measures that support efforts to extend working lifetimes such as age-friendly and healthy working environments. While eligibility for early retirement has been tightened in many countries (e.g. Finland, Belgium), measures to facilitate partial retirement have also developed.

With an increase in the average duration of pension payments, the issue of maintaining purchasing power through pension increases becomes more important. Guaranteeing pension increases or linking these to an index may respond to the issue, although a number of systems still have ad hoc increases.

Box 3.1 addresses the questions of financing systems and intergenerational equity, which relate also to the consequences of increased life expectancy. Indeed, some pension systems automatically link changes in life expectancy to system parameters (e.g. contribution rates, eligibility requirements), while others have made early retirement less attractive or have encouraged later retirement.

To be effective, changes in retirement systems also require other policy changes. For example, the retention and reintegration of older workers into employment. This can entail the use of subsidies for employers who recruit older jobseekers, or salary supplements for older workers that can compensate workers for earnings in a new job that are lower than the earnings in the job that was lost.

In respect of health systems, while the utilization of health services does increase with age in high-income countries, the trend is less marked in middle-income countries and such a relationship simply does not exist in low-income countries (WHO, 2015a). This suggests that there is an often significant unmet need and implies that systems need to address the barriers to access – both financial and practical – to ensure that those that most need health services, do actually receive them. While the cost of care is often a barrier (60 per cent of respondents of the WHO World Health Survey cited financial reasons as the reason why they did not access health services), the access of the elderly population to social security also needs re-assessment and to be better tailored. In low-income countries, the cited reason why those aged 60+ did not access health services is often significantly different from that identified by the young. In one survey, nearly 30 per cent cited lack of transport as the main reason with the same proportion citing the cost of transport to the medical facility (WHO, 2015a). Therefore, providing transport and decentralizing certain health services may already address some of these issues. Other countries specifically target access to health care for the elderly (Box 3.2).

**Box 3.1.** *Effective and statutory retirement ages*

Reforms undertaken also reflect the fact that the statutory retirement age rarely coincides with the effective retirement age. When the former is higher than the latter, this is often due to early retirement benefits (however it can also be the impact of fewer job opportunities for those aged 55+ or owing to health reasons). The focus on reforming systems has also included reforming early retirement, but such measures need to go hand in hand with labour market measures. The trend has recently been for a narrowing of the gap between statutory and effective retirement ages.

60. In Finland, it is possible to take a percentage part of the pension (20, 40, 50, 60 or 80 per cent) and continue working.

**Box 3.2.** *Priority pass access to health services*

In 2012, Kuwait introduced a card granting priority access to older people to general medical and chronic disease management clinics. The Ministry of Health provided the card through local primary healthcare centres, with more than 31,000 cards distributed, corresponding to about 51 per cent of the eligible population. An initial survey revealed that cardholders reported dramatically reduced waiting times and an increase in the duration of consultations (WHO, 2015a).

## 3.2. Impact of trends on social security

### 3.2.1. General impacts

As a consequence of people living longer and birth rates falling, the age profile of populations has changed dramatically. Some of the key impacts for social security systems are the following:

- Financing of retirement, health and disability benefits, typically on a pay-as-you-go basis, will become more challenging even with increases in retirement ages. The number of active contributors per retiree has already fallen significantly and will continue to do so.[61] The European Union, for example, will move from currently having four working-age people for every person aged 65+ to two working-age people by 2060 (EC, 2015a) – although a better measure is to compare the actual contributors to the system with those aged 65+ not in the labour force. To ensure retirement systems are sustainable, benefits will need to be reduced, contributions increased and/or employees will have to work longer.
- The ageing of the population means that the profile of assessed disability and illness also shifts. Diseases that affect the elderly population more will naturally increase in proportion.
- Increasing longevity means that family caregivers are increasingly older themselves. When coupled with higher employment participation rates for women, this has implications for work productivity and the ability of these caregivers to deliver appropriate support. In addition, this increasing burden often leads to a deterioration in health status.
- Providing long-term care for elderly populations is likely to be increasingly challenging due to increasing costs on the one hand and changes in family structures on the other hand (Box. 3.3). The implication of lower birth rates is that informal family-based care becomes more challenging; other societal changes (e.g. greater dispersion of family members and rural to urban population shifts) exacerbate the problem, leading to increasing demand on social security systems to provide care. In short, there will be a widening gap between the supply (both formal and informal) and the demand for such support. The only feasible response is to move from a reactive approach to a proactive one.

An older age profile makes the reform of social security systems, particularly retirement systems, more difficult given the increasing relative proportion of the population that have more to gain from preserving or increasing the real value of pensions and who, typically, are more likely to vote and influence government policy. However, this risks negatively influencing the social contract between generations – in the last few years the poverty rate of those aged

61. With flexible retirement ages and part-time working, the concept of a working age versus retired population will become increasingly blurred.

**Box 3.3.** *More than half of the world's older persons – some 300 million– lack quality long-term care*

A 2015 ILO study reveals that nearly 90 per cent of elderly people in Africa do not receive necessary long-term care services, while in Asia there is a shortage of over 8 million long-term care workers despite the fact that it is estimated that 80 per cent of such work is provided by unpaid female family members. Only 5.8 per cent of the world's population live in countries with universal long-term care coverage. Although nearly 50 per cent live in countries with some provision, expenditure is often so low that coverage gaps and quality issues are an important concern. Countries that have put in place appropriate care note the positive impacts on employment (those employed directly in care-giving, but also by freeing family members to continue their own career), social cohesion and the reduction in direct medical costs (Scheil-Adlung, 2015). The report recommends guaranteeing universal long-term care protection, financing through national social insurance schemes or general taxation, reducing out-of-pocket payments, and increasing the long-term care workforce through incentives and training initiatives. In addition, to encourage flexible working conditions for informal workers, better coordination between different services and supporting community initiatives can be effective.

65+ in OECD countries has actually decreased whereas poverty rates for children and the young have increased. In the mid-1980s those aged 65–74 were 30 per cent more likely than the general population to be in poverty; in 2013 they were 30 per cent less likely to be in poverty. While an improvement in the situation for seniors is to be welcomed, it has not been uniform and has financing implications for social security.

- On a broader issue, as societies age future economic growth will be more dependent on productivity gains than population growth. Following the 2008 financial crisis, productivity has fallen in most OECD countries with an impact on financial resources for social security systems.
- Although mainly in Europe, the implications of the decline of the native-born population in a number of countries (e.g. Switzerland and Germany) has resulted in increasing numbers of immigrants. While this generally provides a short-and medium-term improvement to pay-as-you-go financing,[62] it also requires tailored administration and communication measures to inform new populations about their rights and obligations. Related to this is the increasing importance of bilateral and multilateral agreements, which set the framework for the calculation and payment of social security benefits when workers have accrued rights in more than one country.[63]

## 3.2.2. Examples of policy and administrative responses

- A fundamental review of financing mechanisms is taking place in certain countries. Aside from the need to consider the financing burden on each age group and therefore the question of intergenerational transfers, such measures seek to reinforce the adequacy of benefits. While pay-as-you-go systems imply a certain social contract between generations, this is arguably under pressure given the potential subsidies from the young to the old. However, for a country to have an older population is not a negative situation per se; ageing may be a one-off process to a new steady state with an older population profile, which although bringing different challenges for social security systems may also bring advantages (Box 3.4).

62. Studies show that migrant workers tend to contribute in the short term more than they receive, but longer-term studies are required to assess lifetime balances of contributions paid and benefits received. Results are sensitive to how many years the worker remains in the host country, family status and the benefit structure of the social security system (e.g. vesting periods, number of years required for a minimum or a full pension).

63. See ISSA (2014b).

**Box 3.4.** *Focus on retirement systems: Approaches to population ageing*

The IAA Population Issues Working Group report (IAA, 2016) summarizes different approaches into different categories of responses:

- Increasing the eligibility age for the full pension – many countries have increased the retirement age. Many OECD countries have or are in the process of increasing retirement ages for men and women, with many moving to age 67 or 68 for both sexes.
- Indexing the eligibility age for the full pension – similar to the previous bullet, but changes are (automatically) linked to an external, normally demographic, factor. For example, changes made to the retirement age should ensure that the average ratio of expected duration spent in retirement and working career remains constant (e.g. Denmark, the Netherlands, and the United Kingdom).
- Use of sustainability factors (adjustment factors based on measures or indicators of sustainability). This approach may leave retirement age unchanged, but adjusts the amount of pension paid depending on changes in life expectancy. To avoid a lower pension, systems (e.g. Finland and Spain) offer the opportunity to defer the pension for a higher retirement income. While the approach supports sustainability it does raise questions regarding the adequacy of benefits and the ability of individuals to adjust behaviour to compensate for the reduction in benefits. For example, allowing additional accrual of benefit requires that the employment market and labour law permit longer careers.
- Increasing early retirement disincentives and/or encouraging later retirement (e.g. Canada, France, Ireland and Portugal). To be effective, such measures require excellent communication and administration as there is still a trend for individuals to retire early even when it is not in their financial interest (i.e. with punitive early retirement factors).[1] In turn, later retirement is still not favoured, even with generous incentives (this may also be because employers are often not keen to prolong employment contracts). The example of Sweden's "Orange Envelope" shows how the provision of concise and relevant information can encourage later retirement by providing annual information to beneficiaries in a clearly understandable way.[2]
- Tightening eligibility requirements – by increasing, for example, the number of years of contributions required for the minimum or full pension. Once again, such a measure may be regressive and it is important to consider the adequacy implications of such an approach.
- A key element is maintaining the employability of workers - both younger and older – and effective preventive measures (accident prevention, workplace health promotion) can facilitate longer working lives. This is especially important in economic downturns where measures to keep workers in employment are effective (e.g. partial unemployment scheme in Belgium).
- In certain countries where birth rates have fallen dramatically, measures to support families (such as childcare provision, family allowances) have shown an impact on fertility rates. However, such interventions require short-term investment (e.g. health, housing, education, etc.) while their positive impact on sustainability will only by generated in the long-term. Facilitating migration can be an effective response, although accompanying policies are required. In any case, such measures only delay the inevitable ageing of the population that needs more fundamental, innovative and sustainable responses (such as age friendly employment policies).

*Notes*: [1] Conversely, these workers receive lower benefits than their entitlement and therefore cross subsidize other workers. Therefore, early retirement factors should be designed carefully, as those that are too punitive are most likely to disadvantage those with poorer health or in lower social classes who are "locked in" to lower lifetime benefits. [2] For more details, see "Orange Envelope". [3] See Models of Good Practices.

- The contribution base is increasingly under pressure because of the transformation of labour markets. Informal economy work remains the reality for a majority of workers in Asia and Africa. New flexible contracts akin to being self-employed have arisen in Europe. It is therefore likely to be increasingly challenging to secure financing from employer and employee contributions. While voluntary funded, supplementary pension schemes may provide alternative mechanisms for some workers to contribute to future retirement income, they does not address the affordability challenge of mandatory programmes. Alternative sources of financing may be considered, including the phasing out of subsidies that are no longer consistent with the aims of the 2030 Sustainable Development Goals and/or national policy objectives (for example, fossil fuel subsidies which are regressive, incentivize behaviour inconsistent with climate change goals, and are expensive. Redirected, these public funds could support the financing of social protection and social security while supporting efforts to reduce greenhouse gas emissions).[64]
- Efforts to increase the participation rates of female workers and persons with disabilities through social security benefits (e.g. family benefits, disability and unemployment benefits linked to retraining, etc.), but also through active employment policies. These include:
  - return to work support for those absent from work due to health reasons (Germany, Switzerland);
  - reductions in social security contributions for the long-term unemployed (Bulgaria);
  - increases in child allowances for self-employed workers that reflect the reality of part-time work for many people (Malta);
  - teleworking grants that assist more flexible working arrangements (Poland);
  - retraining for those in high unemployment industries (Netherlands);
  - investments in adult education and in improving working conditions for part-time workers (Germany);
  - encouraging age-friendly workplaces (Japan).

64. Varying estimates of the cost of subsidies range from USD 500 billion per annum to over USD 5.3 trillion including indirect subsidies.

## 3.3. Inequality in mortality outcomes

### 3.3.1. General impacts

- The distribution of life expectancy is increasingly wide, which has implications for the financing of benefits but also implies cross subsidies between different groups. As the ILO reports, "High earners in high-quality jobs are also usually in good health, fit and eager to continue their occupations, at least part time; those in low-quality and badly paid jobs often have to stop employment relatively early due to ill health or because they have been made redundant" (ILO, 2014). Given that those living longer are usually better off economically, they benefit comparatively more from social security systems. For example, in the United States, those in the higher income group actually receive a better deal than the worse off (Bosworth, Burtless and Zhang, 2016). The inequality in mortality outcomes has arguably less direct impact on other benefit provisions, but access to medical services and preventive measures is often more difficult for those in lower social groups (e.g. medical facilities, healthy eating options, etc.).
- While, with increases in life expectancy, all income groups spend a greater proportion of their life in retirement compared to the time spent working, to a greater degree this has increased for the better off. For example, in the United States, the ratio of years in retirement to contribution years increased from 0.29 to 0.38 from 1979 to 2011 for the least educated group, whereas it increased from 0.32 to 0.46 for the most educated. As the OECD reports, the result of linking retirement age to realised increases in life expectancy means that "lower socio-economic groups will be allowed a lower proportion of their lifetime in retirement than higher groups as a result of such policies" (OECD, 2016a).
- While the provision of benefits in relation to supplementary provision reflects these differences in some countries (so-called impaired life annuities provide a higher conversion rate of accrued savings into retirement income for those with a lower expected life expectancy than for the better off and healthier part of the population), such distinction remains rare in social security systems. However, one example of an approach is an age- and service-related normal retirement age (for example in France), which in effect favours those with lower life expectancy as they generally start work earlier and therefore qualify for a full retirement pension at an earlier age than healthier compatriots. Where there is specific provision in broader retirement systems for those in physically demanding professions (including additional service credit, lower retirement ages for certain professions, retirement age based on service and age), a key challenge is the associated administration requirements and potential barriers to employee mobility. In addition, enhanced early retirement pension provision should not replace attempts to improve working conditions that facilitate longer working careers. This is why – although provision for early retirement for such professions is prevalent in many retirement systems – enhanced provision is generally facilitated through (normally funded) supplementary provision (e.g. Canada, United Kingdom, and Switzerland). At the same time, greater coordination between different social security branches is required to assess those who in the past would have being eligible for retirement, but now claim disability or unemployment benefits in the period up to a reformed higher normal retirement age. In Belgium for example, the unemployment system dispenses certain employees with recognized employment-related medical problems or having worked in physically demanding professions for at least 35 years from having to seek actively employment from age 58.

- While the most obvious implication is for health and disability systems, inequality in morbidity also affects retirement systems (the financing and accrual of benefits depends on the number of contributing active members). Where reforms lead to a reduction in programme costs for one branch of social security, it is important to verify that costs in other branches do not increase.
- The increase in the number of years lived in an unhealthy state has direct implications on health and disability systems but also indirect impacts on other social security branches. In respect of health systems, they lead to a direct cost increase resulting from health provision but also related costs (housing, auxiliary staff, etc.). The issue of long-term care will become an increasingly important issue as family structures change.
- The additional unhealthy years will not necessarily be lived at the end of life. The significant increase in cancers and the effects of non-communicable diseases impact on productivity, unemployment and the ability to look after family members (i.e. there may need to be a substitution of formal care mechanisms for informal ones in such situations).

### 3.3.2. Example of policy and administrative responses

- In a context of increasing retirement ages and the need to work longer, to improve the working environments and conditions of those in demanding jobs to help overcome the physical constraints facing those in such jobs. Access to earlier retirement due to health problems, differentiated retirement ages for some professions, or using a proxy approach (retirement age linked to service and age) nevertheless remain appropriate.
- A number of countries in Europe have addressed the quality of health care services and, more importantly, access to these. Nearly all countries have made structural changes to the management and delivery of health care services, with many (e.g. Czech Republic, Estonia and Finland) specifically improving access to services for vulnerable groups (disabled people, migrants and the poor, amongst others) and others (e.g. Poland, Portugal and Sweden), so enhancing patients' rights. Ireland ensures that children younger than age 6 and adults aged 70+ have free general practitioner care.
- The choice of financing mechanism for health care services also drives access. In the United States, almost 20 per cent of older adults miss health care treatment due to cost related issues, compared to just 3 per cent in France (WHO, 2015a).
- In respect of introducing or expanding health services, one of the key challenges in low-and middle-income countries is the significant level of employment in the informal economy, which makes coverage, record keeping and financing difficult. In Gabon, where the social security scheme was the starting point towards universal health coverage (WHO, 2014b), authorities adopted a gradual approach to membership, starting in 2008 with the poorest, adding state employees in 2010, and private sector workers in 2013 (Ferrara, 2015).
- Effective responses are often preventive and proactive and involve a number of different stakeholders. Active ageing at work policies, preventive measures for non-communicable diseases such as healthy eating initiatives, support networks and more tailored information and responses can all be effective. Better targeting benefits and/or designing benefits to empower vulnerable groups can be very effective.

- In order to mitigate and reverse the inequalities in mortality experience, social security administrations have an important role to play in preventive and ex post measures. In respect of the former, such measures may also seek to reduce morbidity inequalities including supporting healthy eating initiatives, improving health care provision and access, encouraging physical exercise, and supporting anti-smoking campaigns, alcohol abuse campaigns and information campaigns tailored to different at-risk groups (e.g. different languages, communication channels, etc.) (Box 3.5). For ex post measures, minimum pensions and targeted early retirement may redress to some extent the regressive distributional outcomes from retirement systems based solely on service and salary record. For example, for men born in 1940, the bottom mid-career income decile can expect to receive social security retirement benefits in the United States for 18 years compared to some 26 years for those in the top income decile (Bosworth, Burtless and Zhang, 2016).
- Increasing distribution of outcomes requires more tailored responses, not only in benefit design but also in proactive and preventive measures and the administration and delivery of benefits and services. By directing appropriate responses to the groups most affected by the changes identified (e.g. obesity, migrant workers, etc.), this achieves a more effective use of resources.
- Social security can act as a powerful redistributive actor by more effectively meeting life-cycle risks, which fall most on the less well off.
- Access to health care is a key factor in adverse morbidity outcomes. By improving accessibility measures (for example, different means of contacting services, mobile offices, grants for physicians in remote areas, etc.), health services can be provided more easily to larger populations.
- Access to preventive measures (e.g. healthy eating, etc.) also needs to be improved. While the barrier to a healthy diet is often household budget, effective intervention relating to education can work well. In addition, the use of the revenue of soda taxes on supporting relevant measures is developing in a number of countries (e.g. Mexico).
- Chapter 1 presented the underlying causes of morbidity – income distribution, housing, etc. Therefore, to ensure better outcomes, social security is increasingly involved in improving the inputs. Typically, different branches of social security deliver different measures – (conditional) cash transfers, unemployment insurance systems (and active employment policies), etc. Social security institutions can work with other stakeholders to ensure support in the right areas (e.g. job retraining support for unemployment insurance systems).

**Box 3.5.** *The importance of palliative care*

A number of countries' health systems focus most resources on acute care rather than chronic care. Despite a lack of resources, palliative care is likely to be one of the most cost effective approaches to addressing the impacts of an ageing population (Smith et al., 2014). For example, the provision of palliative care within two days of an advanced cancer diagnosis led to savings of 24 per cent compared with no intervention (May et al., 2015).

## 3.4. Changing health challenges (mental health and non-communicable diseases)

Developing countries are witnessing socio-economic and demographic transformations that have led to changing family and gender dynamics. These are bound to have profound implications – both at present and in the future – for social security systems and for women in these countries. To mitigate against the negative implications of these changes on the well-being of women, there is need for concerted public efforts to extend social security coverage in high-informality contexts; to meet the demand for care across generations; and to adapt to increased global care chains. Pathways to this include enacting basic human rights legislation that incorporates the needs of informal workers into existing labour, financial and insurance institutions; delinking social security benefits from labour market status through the provision of cash transfers, including conditional cash transfers as well as through universal health coverage; providing accessible and affordable public care services for children and the elderly and for those in ill-health; and protecting the rights of international domestic workers through policies and practices in countries of origin and destination as well as through bilateral and multi-lateral labour and social security agreements.

### 3.4.1. General impacts

- Over recent decades, the nature of disability cases has changed strikingly, with a greater number of mental health cases (increasingly among the young and a growing proportion of women). The range and nature of cases is variable and therefore requires tailored approaches and qualified personnel. The costs to society are potentially large – long-term costs, caring, losses in productivity, and the impact on family members.
- There is an appreciation that a holistic approach is required, working with other stakeholders to act ex ante and ex post. Key drivers are often exclusion from education, the labour market, family conflicts and poverty. Although some of the measures to address these risks at these different stages and places are beyond the scope of this report, it is important that the pathway from education to the labour market exists for children with mental health issues and learning difficulties. The role of employers is important (for example, IT companies who recognize the special skills of those on the autistic spectrum; see Hickey, 2015), but cannot solve all issues. Links with the health system are also important; previously, certain health systems overprescribed medication for cases that certainly did not merit it (e.g. attention disorder, dyslexia, etc.). The reduction in prescribing expensive medication has clear cost benefits for the financing of health systems. Moreover, medication may work only for those with chronic difficulties.
- Mental disorders that are work related (e.g. stress) are also growing and have financial implications for worker compensation systems.
- Non-communicable diseases have significant direct and indirect impacts on social security. The direct impacts include the health-care related costs and the indirect impacts include losses in productivity, absence from work (with possible reductions in employer and employee and self-employed contributions to social security), the effects on informal carers (absence from work), and disruption to employers.
- Non-communicable diseases also have a distributional impact. Estimates suggest that one in five cases of Alzheimer's disease is attributable, at least in part, to low educational attainment (WHO, 2015a).

### 3.4.2. Examples of policy and administrative responses

Policy and administrative measures need to work in tandem to ensure the effective delivery of appropriate responses. For example, patients with mental health issues are more likely to be obese, smoke tobacco and have multiple non-communicable diseases. Communication to reduce stigma, together with local community-based delivery and coordinating counselling and medication are important.

- The system of disability insurance in Switzerland includes the financing of initiatives for those with learning difficulties such as dyspraxia, ADHD and dyslexia. While there is a recognition that those severely affected may not be apt to work, the vast majority, with suitable support can not only work effectively but also bring different skills compared to those without such difficulties.[65]
- In 2015, dementia affected more than 47 million people worldwide. The estimated global cost of dementia care in 2010 was USD 604 billion. This figure may double by 2030, when more than 75 million people will be living with dementia. Evidence suggests it is possible to lower the risks of certain types of dementia by reducing the risk factors for cardiovascular disease (WHO, 2015a).
- Preventive measures will be increasingly important, especially when coordinated with other interventions across the life cycle. Indonesia is an example where the Ministry of Health has introduced a programme to improve cognitive resilience and functioning including health eating in pregnancy, improving the learning environment at school, and other programmes on stress management, healthy life style and early detection mechanisms.
- Interventions require well-trained and versatile health staff who are likely to work in multidisciplinary teams. Also needed is the greater use of case management and coordination with other providers.

There are a range of potential policy response in respect of other non-communicable diseases, but it is important to place the focus on the most cost effective ones, which are typically preventive. These include actions to reduce smoking, which have a proven track record and have international backing, food regulation and education (including working with food producers), promotion of physical exercise, use of public transport, and urban planning. Cervical cancer screening and hepatitis B vaccinations are also effective. In respect of the management, administration and delivery of health care, the effective training of appropriate personnel, drug availability and palliative care require financing and long-term planning. For older people, emphasis should be on the early detection and treatment of non-communicable diseases.

- **Republic of Korea**. The Korean National Health Insurance System (NHIS) offers examples of effective preventive measures. To respond to significant increases in health care costs for non-communicable diseases over the last 15 years (for example, mental health costs have increased four-fold from 2003 to 2013), the NHIS has developed a number of preventive measures to address the issue. These include targeted screening (cancer screening rates have increased from 29 to 44 per cent from 2006 to 2013), health promotion centres, health care and

65. A significant number of renowned architects are dyslexic.

improved health care information provision. Cancer screening focuses on the five major cancers with a high risk rate and which can be relatively easily detected and treated. Most examinees do not pay for the costs with the maximum co-payment being 10 per cent.

- **Hungary**. In Hungary, a Ministerial Decree on nutritional standards for public catering seeks to ensure that schoolchildren receive a balanced diet as well as proper physical, psychic and mental development.

# Conclusion

This fourth ISSA report on selected megatrends has focused on key future demographic changes and their likely impacts on social security systems. The aim of this report has been to highlight and analyse unexpected, emerging and uncertain trends ahead and to identify possible discontinuities from previous trends. The identification of global and regional trends also reveals that there are often significant variations across and even within countries. In spite of this, the report's objective has been to highlight possible and probable developments that are likely to affect significantly social security systems.

The report has considered how social security systems can respond to demographic changes in ways that are effective and efficient. In this regard, social security institutions and policy-makers should be able to better anticipate and assess how trends are likely to develop and what their impacts will be.

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